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L 24, 1944
ME 33, No. 9

AMERICAN

# DYESTUFF REPORTER

IN BALANCE

UNIVERSITY OF NEBRASKA AGRICULTURAL LIBRARY MAY 3 1944

**Stepped-up schedules . . . tighter specifications . . . new fibers and blends . . . make yours a fast-moving industry. To keep it operating smoothly calls for a fine measure of balance. Balance that can often be gained through co-operation between dyers and dye manufacturers.**

**The ability of our Laboratories and Technical Staff to assist you in maintaining this balance is the measure of our success. Call on us to work with you. Cooperation *now* may throw light on *tomorrow's* problems. E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Dyestuffs Division, Wilmington 98, Delaware.**

*Du Pont Dyestuffs*

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

DU PONT DYESTUFFS

AL PUBLICATION
of the
ROCEEDINGS
AN ASSOCIATION
XTILE CHEMISTS
D COLORISTS

# UNION COLORS

## for COTTON and RAYON PIECE GOODS

Cotton and rayon mixtures must be a solid shade to have sales value.

A complete series of union dyeing cotton and rayon colors is now at your disposal.

Some of these colors have been approved over many years for this purpose, while others are newly invented especially for union dyeing.

Let us demonstrate their superiority.

**ALTHOUSE CHEMICAL COMPANY**
**540 Pear Street, Reading, Pa.**

American Dyestu
New York, 16, N
Post Office, under

# LEVELENE*

## FREE FLOWING, NON-JELLING

More than a trade name.

A penetrant and levelling medium for direct, union, and CELANESE* dyes.

Effective either for stripping or for level dyeing when working with many of the vat type dyes.

A stable, dispersing penetrant for rotproof and mildewproof processing.

Economical and labor saving.

RATHER than ask for a laboratory sample—HAVE one of our technical men bring with him a sufficient quantity for a practical mill run. THEN judge for yourself as many mills have done and profited thereby.

*Reg. U.S. Pat. Off.

AMERICAN ANILINE PRODUCTS, INC.
50 UNION SQUARE — NEW YORK, N. Y.

— Dyestuffs —
Plant: Lock Haven, Pa.

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55 Pine Street

Philadelphia, Pa.
210 N. 13th Street

Toronto, Can.
Dominion Anilines & Chemicals, Ltd.
265 Adelaide Street West

Boston, Mass.
190 High Street

Chicago, Ill.
820 South Clinton Street

Charlotte, N. C.
301 East Seventh Street

Los Angeles, Cal. — 1019 South Grand Avenue

*Reg. U. S. Pat. Off.



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# FOR YOUR CHLORINATING PROCESSES And OURS

The chlorinating agents listed below, used by Hooker in the manufacture of many of its own chemicals, are available in the same good quality for your commercial chlorinations.

Sulfuryl Chloride and Thionyl Chloride are, in particular, highly reactive and useful in the production of a variety of organic chemicals.

HOOKER ELECTROCHEMICAL CO

**HOOKER SULFURYL CHLORIDE ($SO_2Cl_2$)** is used in the manufacture of chlorphenols, organic acid chlorides and anhydrides, sulfonyl chlorides which are detergent intermediates, and other organic chemicals. It may be used in the production of anti-shrink wool.

**HOOKER SULFURYL CHLORIDE** is a clear, heavy liquid supplied in 5-gallon carboys holding 65 lbs. net, 12-gallon carboys holding 150 lbs. net, and 55-gallon steel drums holding 725 lbs. net.

**HOOKER THIONYL CHLORIDE ($SOCl_2$)** is used in the manufacture of organic acid chlorides and anhydrides and of alkyl chlorides from corresponding alcohols. It is a yellow to deep orange liquid, supplied in 5-gallon carboys holding 65 lbs. net, and 55-gallon steel drums holding 725 lbs. net.

## Other Hooker DYESTUFF CHEMICALS INCLUDE

Aluminum Chloride (Anhydrous) • Antimony Trichloride (Anhydrous) • Benzal Chloride • Benzotrichloride • Benzoyl Chloride • Benzyl Chloride • Chlor Anisidine • 2:5 Dichlor Aniline • Meta Nitrobenzoyl Chloride • Monochlorbenzene • Monochlortoluene • Para Nitrobenzoyl Chloride • Phosgene • Sulfur Dichloride • Sulfur Monochloride.

*For additional information about Hooker Chlorinating agents or dyestuff chemicals write*

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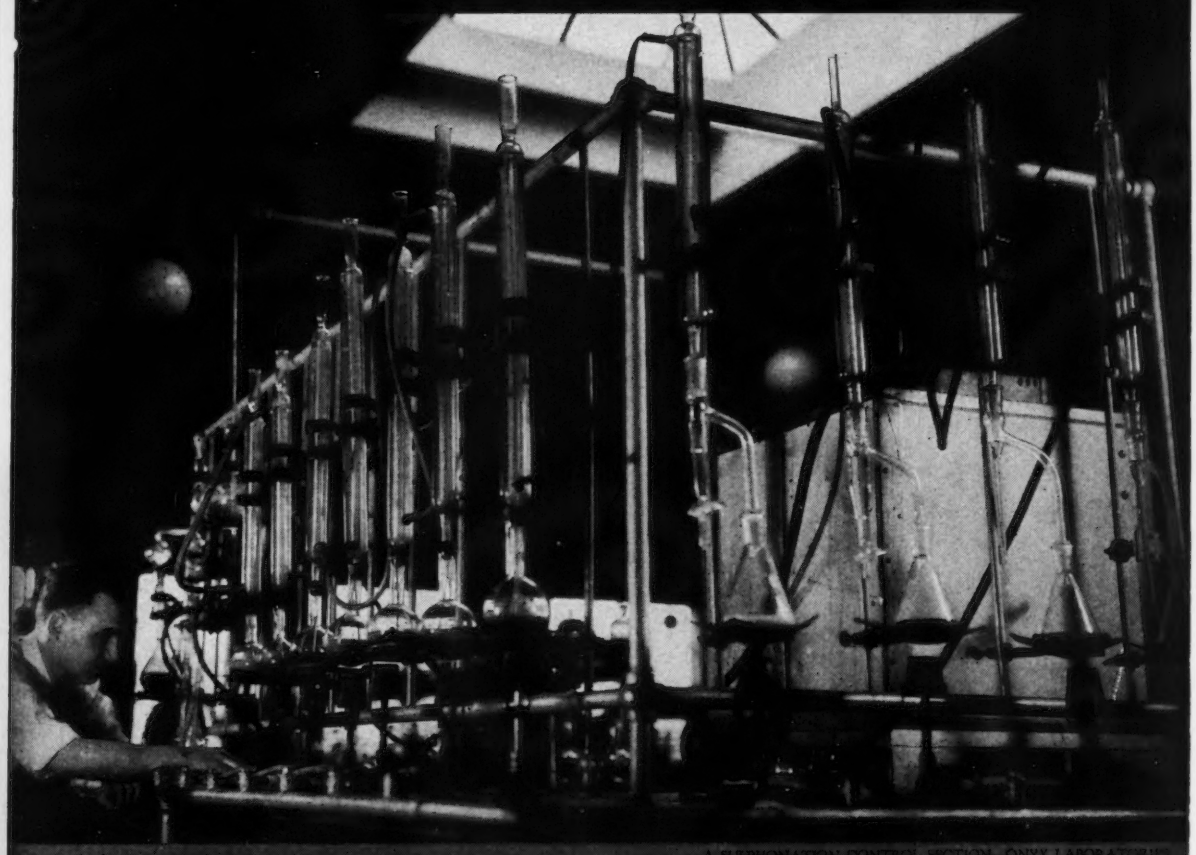
ARMY E NAVY

HOOKER ELECTROCHEMICAL COMPANY

# Hooker CHEMICALS

5438

# ONYX



A SULPHONATION CONTROL SECTION—ONYX LABORATORIES

## SULPHONATION

For more than thirty (30) years we have been leaders in the development and manufacture of sulphonated products for the textile and allied industries. Extensive research enables us to successfully apply many methods of sulphonation to produce finishing and processing oils, detergents, wetting and emulsifying agents and a great variety of specialized products. Your inquiries are solicited.

ONYX OIL & CHEMICAL COMPANY

JERSEY CITY, N. J.

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# LOVELY LEGS FOR A LASTING IMPRESSION

Even a soldier's good-bye can be enhanced by beautiful legs, for as every girl knows there is a direct line between smartly sheathed feminine limbs and fluttering masculine hearts. No matter how badly material shortages grow, she's going to hold that line . . . she's going to have sheer, beautifully finished, lasting hosiery. ● To help hosiery makers and dyers with their difficult responsibility of glorifying the most beautiful legs in the world, with properly-finished hose, our staff has been working harder than ever before. The Fancourt man is ready to place the results of this work and our many years of experience at your service.

## W. F. FANCOURT & CO.

**PHILADELPHIA, PA.**

*Solving Finishing Problems Since 1904*
*In the South: Howard A. Virkler, Greensboro, N. C.*

# AFTER THE WAR

After the storm of war is over...there will be a rainbow of more cheerful colors breaking over the world which will echo new notes of courage and optimism. When we have won this conflict, the sombre hues and drab garbs of these dimout days will be supplanted by an inevitable reversion to brighter colors.

When peace comes, General's phenomenal war production will be converted to peacetime requirements, releasing unlimited quantities of the finest and most durable dyestuffs known.

**GENERAL DYESTUFF CORPORATION**

*QUALITY DYESTUFFS*

FOR PIGMENT PRINTING
and PIGMENT DYEING
in WATER SOLUTION..

# SHO-PAL
THICKENER and BINDER

**WASH FAST** when the printed or dyed cloth is dried . . . eliminates curing.

**DRY PRODUCT** . . . easy to handle . . . saves shipping and storage space.

**NO SOLVENT** . . . does not damage rubber blankets.

**ANY OTHER TYPES of COLOR** can be used because the paste is made up with water.

**WIDE PIGMENT CHOICE** . . . you can select your pigment colors from several sources of supply.

**SHO-PAL** is being used successfully by many textile plants for

***High Quality Results at Low Cost***

Prove these values for yourself.
Order a trial lot of Sho-Pal today.

78 YEARS OF STARCH SERVICE

## STEIN SH HALL

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A TEXTILE STARCH FOR EVERY TEXTILE PURPOSE

Another CHEMystery Solved Through Research

# LOST . . .
IN LAUNDERING
The soft, drapy hand, the original finish of good fabrics

# FOUND . . .
THROUGH LABORATORY RESEARCH

# ULTRAMIN*

**The superior finishing medium that maintains the soft finish of fabrics even after consecutive launderings**

ULTRAMIN, a research development of Ultra Chemical Works, is to-day one of the standard finishing mediums in leading textile mills. Ultramin is superior in many ways. First, it simplifies and reduces the cost of textile processing. By using Ultramin, the finishing operation takes place in most cases in the last wash, after dyeing. Thus, the finishing operation is reduced to framing only. Fabrics and fibres finished with Ultramin will maintain a permanent and soft finish . . . even after consecutive launderings. As an added feature, Ultraminized fabrics will withstand dry cleanings without impairment to the original finish. Why not see for yourself just what Ultramin can do? One of our technical men will be glad to bring a sufficient quantity for a practical mill run. There is no obligation, of course. Simply write or wire—

## ULTRA CHEMICAL WORKS
INCORPORATED

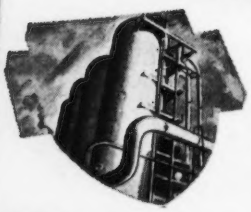
Paterson, N. J. Chicago, Ill. New York Office, 500 5th Ave.

OTHER ULTRA CHEMICAL PRODUCT DEVELOPMENTS . . . . . DETERGOL • SULFRAMINE DT PASTE
SULFRAMINE DR PASTE • SULFRAMINE POWDER • ALBUTEX • ALBUTINE • DERMASOL • ULTRA GLOSS B • DULLITE T

* Ultramin is made from an exclusive formula — U. S. Pat. Pending ULTRAMIN—REG. U. S. PAT. OFF.

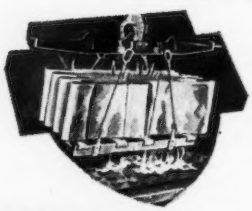
# GENERAL CHEMICAL

## AGAIN GENERAL CHEMICAL CREATES NEW FACILITIES FOR SULFURIC ACID TO SERVE AMERICAN INDUSTRY

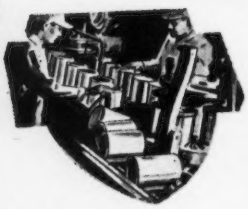


**Petroleum**
Alkylation, sulfonation, and improving color, odor, and stability of petroleum products.

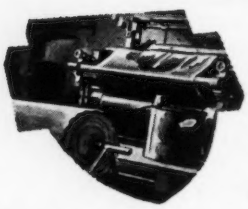
**Rayon**
Used in the spinning bath in rayon manufacture.



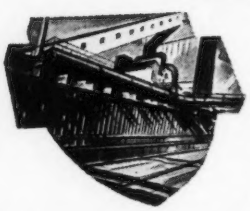
**Steel**
For pickling of steel sheets and castings, removes oxides and scales.



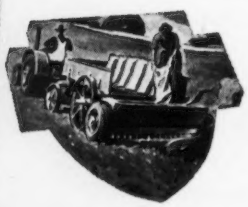
**Paints**
Raw material in production of pigments; for sulfonating drying oils.



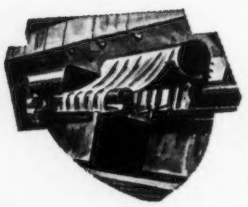
**Sulfonation**
Sulfonating vegetable oils for water, fire, and mildew-proofing fabrics and textiles.



**Coke By-Products**
For washing toluene and benzene, raw materials for dyestuffs and explosives.



**Fertilizers**
Used in super phosphate and ammonium sulfate production.



**Textiles**
For carbonizing wools and for the dyeing bath in production of textiles.

**GRADES OR STRENGTHS**

Standard: From 60° Baume to 65% Oleum (114.6% $H_2SO_4$)

Special High Purity:
Diamond—66° Baume, Carboys Only
Crystal —66° Baume, 98% $H_2SO_4$
*From Carboys to Tank Cars & Barges*

**RECENTLY RELEASED:** New technical information on physical and chemical properties of Fluosulfonic Acid. Write nearest Technical Service office for Bulletin 33A.

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HERE'S A NEW STANDARD CHEMICAL PRODUCT YOU SHOULD INVESTIGATE
LANAFIN 79—AN OUTSTANDING DEVELOPMENT FOR SIZING RAYON HOSIERY YARN

**Lanafin 79 is a recent development that is proving of great interest to viscose hosiery yarn processors. This sizing can be applied by conventional methods or at room temperature—without any solvent, but without drying. Call, write or wire for complete information on this unusual product today. Here at Standard Chemical Products we have sufficient capacity to deliver larger quantities of our complete line of processing and finishing agents promptly. Our manufacturing process is under strict laboratory control by sound, practical technicians who have had long mill experience.**

"Stantex" Coning Oils
Stanteosine Softener—For piece goods finishing
"Standapol" and "Stantex"—
Finishing, sizing and throwing oils
"Lanafin" Size No. 72 (Water Soluble)

"Stantex" 629 Static Inhibitor
"Lanafin" Soaps and Oils
Pyrotex—For boil-off and dyeing
"Stantex" 3005 Finish
(Staple Fibers)

REG. U. S. PAT. OFF.

# STANDARD CHEMICAL PRODUCTS, Inc.

HIGH POINT, N. C. CHATTANOOGA, TENN. PROVIDENCE, R. I.

13th and JEFFERSON STREETS, HOBOKEN, NEW JERSEY

ANDOVER, MASS. PATERSON, N. J. SACRAMENTO, CAL.

# PERMA-PAR*

## PRODUCTS

### PERMA TERGE*

A highly efficient scouring compound for use on all types of spun rayon, rayon sheers, rayon crepes, pigment and bright yarn, crepes, taffetas, nylon, Aralac-wool mixture, and Aralac-spun rayon mixtures. Scouring with PERMA TERGE softens the fibre. This compound is especially recommended for jig work.

### PERMA WET*

It is an alkyl aryl sulphonate type of wetting agent active at low and high temperatures. It is used for the wetting and dispersing of vat dyestuffs and makes a valuable addition to wool fulling baths.

### PERMA PAR K*

A superior two-purpose "boil-off" compound and softener. Tends to soften fibres besides "boiling-off" and serves as a prefinish. Used also as an addition to the dyebath for better penetration and dispersion, thereby giving increased dye solubility and color value. It has been found to be an excellent kier assistant, in place of the usual soaps, solvents, etc.

### PERMA PAR R*

An improved permanent Cation Active Finish—Imparts a heavy, smooth softness and mellow hand to all types of fabrics.

REG. U. S. PAT. OFF.

### VELVAMINE K-90*

**An improved softening and finishing agent suitable for all types of fabrics as it imparts an odorless finish, resistant to washing and dry cleaning.**

**Can be used as a substitute for sulphonated oils, tallows and other softeners, and its use eliminates yellowing and rancidity often encountered with the usual fatty type of softening agents.**

**Can be used in conjunction with starch, wax and resin finishes, where it acts as a plasticizer and improves the hand of the finished goods.**

**When used with dullers, it gives a softer hand and greatly reduces the dusting of the finished goods which is common to most pigment type dullers.**

**It is an excellent treating agent for rayon prior to spooling and knitting as the treated rayon becomes very smooth, supple and elastic.**

### PERMA-SET*

**A permanently plasticized resin emulsion readily dispersible in warm water.**

**Can be used on all types of fabrics to impart a non-slip finish.**

**It produces a crisp hand which can readily be controlled by varying the concentration in the finishing bath.**

**Finishes are rendered more permanent by the use of an acid forming catalyst such as ammonium chloride (sal ammoniac) or ammonium sulphate in the bath. Material treated in this manner should be dried at as high a temperature as possible in order to insure proper setting of the resin.**

### PERMA PAR SOL*

A non-foaming compound having strong wetting, penetrating, dispersing, emulsifying and cleaning properties. A valuable assistant for low temperature and pad dyeing and an excellent cleansing agent for goods that contain graphite, loom grease, mineral and vegetable lubricating oils.

### PERMA-CIDE*

Compounds for imparting bacteriastatic, fungistatic and mildew resistant finishes to textiles, paper and leather. Special PERMA-CIDES (A-5, AM-10, AL-10, OS, E and E1) make it possible to apply these finishes from aqueous, hydrocarbon or other solvent solutions. They are compatible with water repellents, cellulose solutions, paints, and other coating compounds. The water soluble PERMA-CIDES make excellent preservatives and mold inhibitors for both carbohydrate and protein sizing solutions.

### PERMA FIX*

A compound which fixes direct colors on cottons and rayons and also acts as a softener. Applied in the last rinse, it greatly reduces the bleeding and crocking of direct colors.

### VAPOLINE*

A wood carding oil for oiling loose wool or shoddy. Makes perfect and stable emulsions in water.

**PERMA-SET and VELVAMINE K-90 are new products in the PERMA-PAR group**

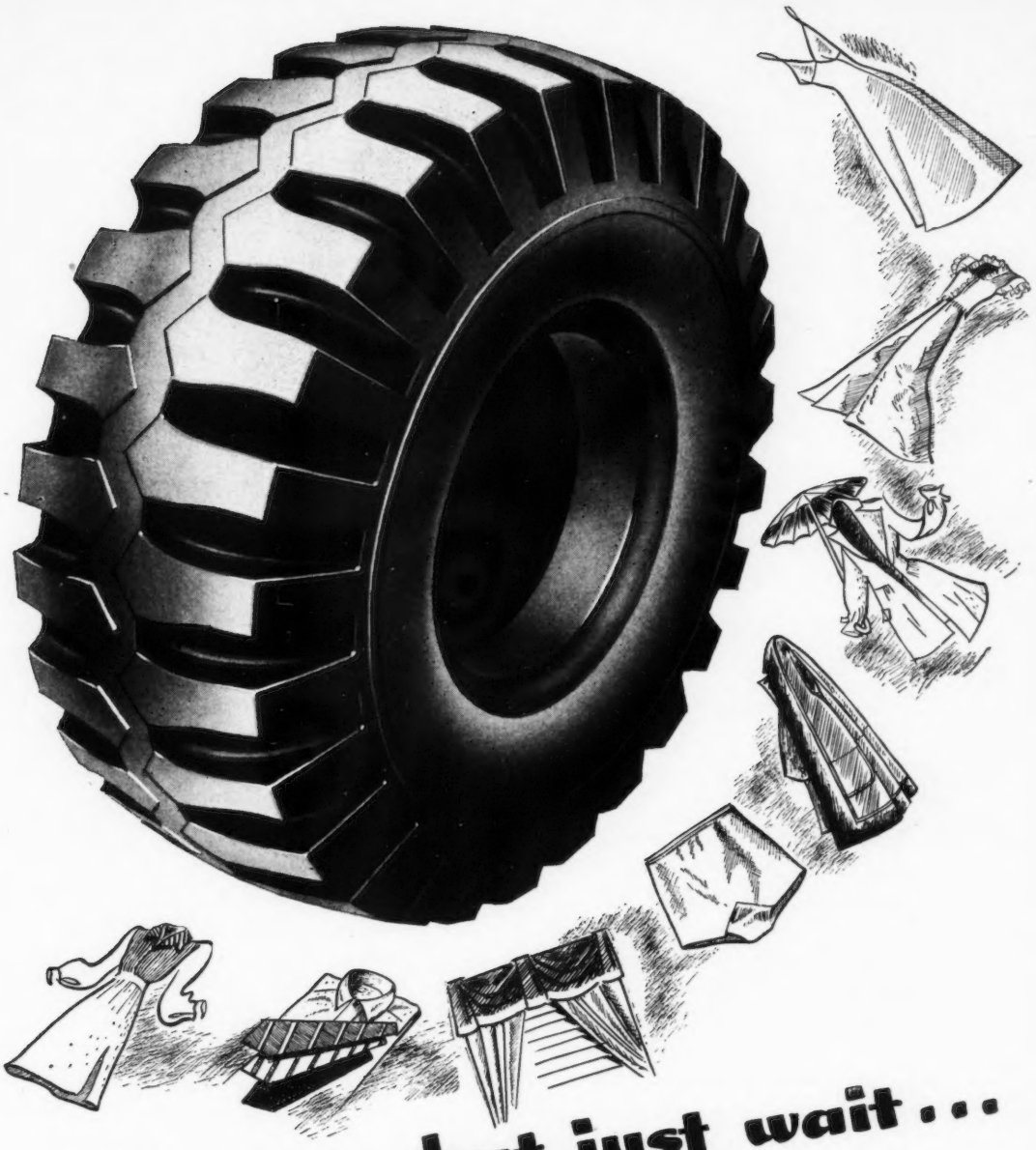
REFINED PRODUCTS COMPANY

*Lyndhurst* • *New Jersey*

New England Representative: E. L. LEGG, P. O. Box 397, Providence, R. I.

Canadian Selling Agents: BERKELEY PRODUCTS CANADA, LTD., 41 Hillcrest Avenue, St. Catharines, Ontario, Canada

PERMA-CIDE • PERMA-TERGE • PERMA FIX • PERMA WET • PERMA PAR R • PERMA PAR K • PERMA PAR SOL • VAPOLINE



# It's G.I. now - but just wait . . .

Many a strand of rayon yarn is jouncing along some craggy Italian road, or landing on some British airfield, that a few years ago would have seen no more active life than comes with being part of a dress, or a suit of clothes.

For the rayon yarn produced by Industrial's new and exclusive "Continuous Process" is so uniform, so strong, so free of knots and broken filaments, as to lend itself perfectly to the making of tire cord for tires that must stand the gaff of high speeds, rough going and terrific impact. Once the war is won, this yarn known as *TYRON will be widely used by the tire industry.

For the thousand and one additional needs of a nation at peace, this same high-quality yarn, in textile sizes, will be available under the famous name—*Spun-lo

Keep your eye on *TYRON and on *Spun-lo. They're part of the textile tomorrow.

*Reg. U. S. Pat. Off.

Industrial
RAYON CORPORATION
MAKERS OF
CONTINUOUS PROCESS RAYON YARN
AND Spun-lo KNIT UNDERWEAR CLOTH

CLEVELAND, OHIO • New York Office, 500 Fifth Avenue

# in WAR or PEACE

## ARKANSAS PRODUCTS *Serve Dependably*

**FUNGICIDE:** A mildew proofer made in various types to meet all government specifications.

**ARKO FIRE RETARDENT:** For flame-proofing uniform cloth, felt and all types of rayon and cotton fabrics including theatrical drapes.

***AQUAROL:** A water repellent for uniforms, overcoatings and other military fabrics; also all civilian garment cloth.

***PARAMINE:** A cation active softener for processing cotton and rayon cloth to obtain a soft, smooth, pleasing finish.

***ALGEPON P.:** A retarding agent for vat and sulphur dyeing to prevent premature oxidation of the dye-stuff or in other processes when necessary to retard exhaustion to obtain a uniform shade.

***PARAPON S. A.:** A highly efficient leveller and softener used in dyeing and finishing all types of viscose and acetate rayon. Excellent for processing tricot cloth.

**ARKOLA G.:** For finishing rayons to impart a full, better feeling hand and additional weight. An excellent substitute for glycerine for printing and finishing.

***CULOFIX:** Used as an after treatment in last rinse to prevent bleeding of direct dyed cotton or rayon in water.

***DIAZONOL A. C.:** For boiling out cotton cloth in pressure or open kiers to produce greater absorbency and cleaner material. Excellent for preboiling knitted cloth in preparation for chlorine bleach. Also used with good results for boiling out cotton or rayon cloth in the jig.

*And a Complete Line of Oils, Chemicals, Softeners and Finishes*
*For Wet Processing All Textile Fibres*

*Reg. U.S. Pat. Off.

## ARKANSAS CO. INC., NEWARK, N. J.

***Established 40 years***

# AT LAST...

## KARBATE Trade-Mark CENTRIFUGAL PUMPS *for corrosive liquids*

THE "Karbate" Model A Centrifugal Pump, with a trouble-free rotary seal, is now available for the chemical process industries. From inlet to outlet, liquids handled by the pump are in contact with "Karbate" material, a treated carbon stock that is resistant to practically all corrosive fluids . . . including *mixtures of acids,* such as HCl and $H_2SO_4$.

Outstanding features of the "Karbate" Model A Centrifugal Pump are:

- **All "Karbate" construction**
- **No chance for metallic contamination of liquid**
- **"Karbate" rotary seal eliminates use of stuffing box—non-metallic compression member—no springs to rust**
- **All gaskets confined**

The registered trade-mark "Karbate" distinguishes products of National Carbon Company, Inc.

★ *BUY UNITED STATES WAR BONDS* ★

Because "Karbate" materials have exceptional resistance to extremes of thermal shock, sudden temperature variations of the fluid cannot damage the pump. Leakage is completely avoidable with reasonable care. Maintenance costs are extremely moderate.

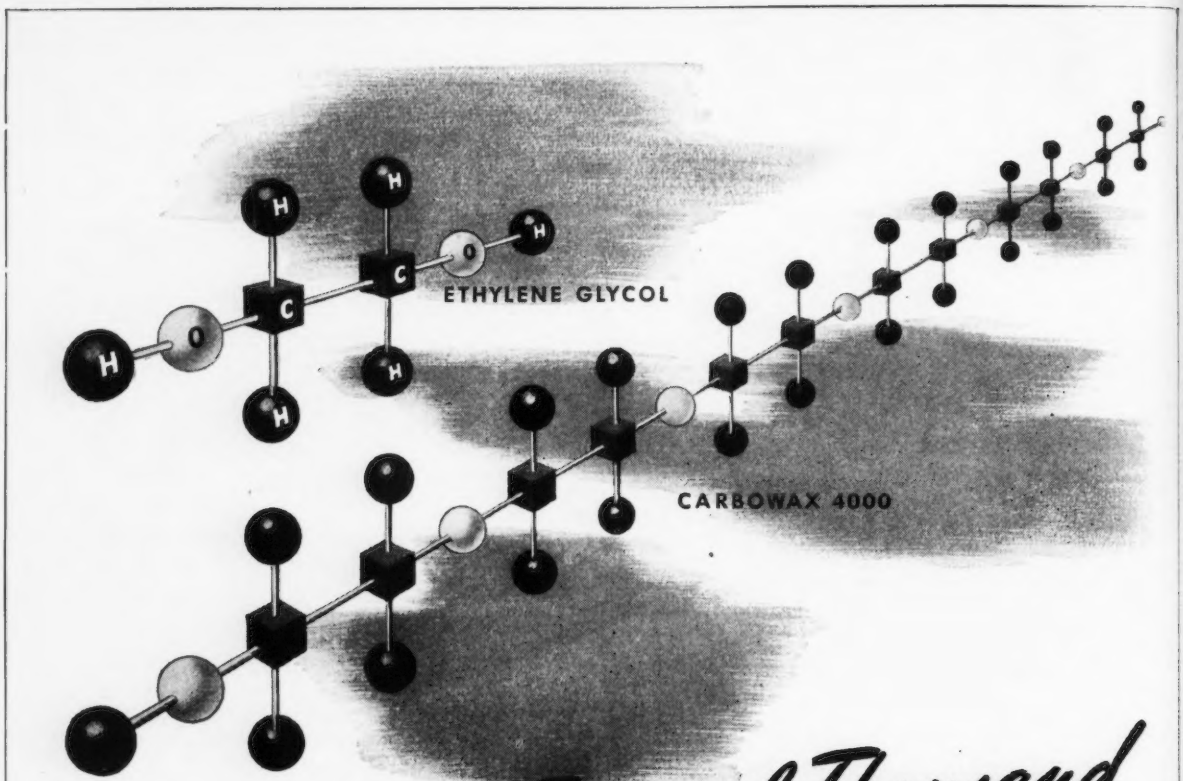
Furnished in 3 sizes, the largest lifting fluids against a 100-foot head, the pump has proved itself in prolonged tests and has been giving satisfactory plant service for several years.

Our representatives will gladly furnish details on the pump characteristics and on the corrosive liquids it is now handling.

**NATIONAL CARBON COMPANY, INC.**
*Unit of Union Carbide and Carbon Corporation*

UCC

Carbon Products Division, Cleveland 1, Ohio
New York, Pittsburgh, Chicago, San Francisco




# From 62 to Several Thousand

THE two molecules pictured here are smallest and largest in the family of glycols produced by Carbide and Carbon Chemicals Corporation. With molecular weights from 62 for liquid Ethylene Glycol to several thousand for wax-like Carbowax compound 4000, the family consists of 5 simple glycols and numerous polyglycol mixtures. These chemicals are so important that some of them are now restricted to essential war applications.

The glycols have distinctive family traits: water solubility, a wide range of hygroscopicities, low vapor pressures, high boiling points, and the ability to lower the freezing point of water.

In the textile industry glycols are especially important as humectants, as well as in softening and lubricating fibers. Glycols are good solvents for a variety of dyes and are used as well in the preparation of non-drying printing pastes.

Carbowax compounds are particularly useful in the dispersion of dyes and for the lubrication, softening, and sizing of textiles where their complete water-solubility facilitates their removal.

Carbide and Carbon Chemicals Corporation was the first chemical company to develop large-scale production of glycols. Our chemists and engineers have also pioneered the development and production of 12 other important chemical families . . . including alcohols, ethers, amines, and ketones . . . useful raw materials for many industries.

Today we are producing in commercial quantities more than 160 synthetic organic chemicals . . . and more than 40 of these in tank car quantities. After the war these versatile chemicals will be available in greater quantities than ever before, and many new compounds with them.

For further information about the use of these chemicals, write to us.

**SOME OF THE GLYCOLS WE MAKE**

- Ethylene Glycol
- Diethylene Glycol
- Triethylene Glycol
- Polyethylene Glycols
- Carbowax Compounds
- Propylene Glycol
- Dipropylene Glycol

**BUY UNITED STATES WAR BONDS AND STAMPS**

**CARBIDE AND CARBON CHEMICALS CORPORATION**

*Unit of Union Carbide and Carbon Corporation*

UCC

**30 East 42nd Street, New York 17, N. Y.**

PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

"Carbowax" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

Pioneering
WITH Pigments
—one of a series of developments illustrating the advantages of Aridye* pigmented colors in new and significant applications

—From a photograph courtesy of BANGOR MILLS, INC., Bangor, Pa.

# HOW ONE FINISHER† Dyes and Flameproofs SHRIMP NETS

Many hours have been saved in the dyeing, mildewproofing and flameproofing of tricot camouflage shrimp nets by a continuous, straight-line operation.

The Aridye* CFP colors used in this process were developed by the Aridye Laboratories for an all-solvent method of application. They contain lightfast pigments, especially selected so as not to aid combustion, binders that increase resistance to weathering and the necessary flameproofing and mildewproofing ingredients.

The fabric is impregnated in narrow widths by means of a micro-set padder. It is passed immediately into a drying chamber, after which it is ready for inspection and assembly into full-size nets. High curing temperatures are not necessary since Aridye CFP colors require no "curing" in the usual sense of the word, but only the removal of the solvent.

The development of Aridye CFP colors has made this process possible. And in addition to tricot—nottingham, Raschel and lever's lace can also be dyed, mildewproofed and flameproofed, now and after the war, in the same continuous, time-saving padding and drying operation. It is expected that this wartime pioneering accomplishment will lead to increased use of flameproofing. Here is proof again of the versatility of pigment colors—proof that pigments frequently offer the best and simplest way of doing the job!

*An illustrated, more detailed folder has been prepared on Aridye CFP colors and "after the war" flameproofing. It will be sent without obligation to any finishing plant requesting it. Send for your copy today!*

*Reg. U. S. Pat. Off.

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# AMERICAN DYESTUFF REPORTER

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**APRIL 24, 1944**

**VOLUME 33 NUMBER 9**

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And so it goes . . . wages and prices chase each other up and up . . . until prices get so high that your dollar isn't worth a dollar any more.

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Of course it's hard to give up the luxuries of life . . . and even harder to give up some of the necessities. But this is War! And when you think of the sacrifices our fighting men are making . . . many of them giving up their lives for us . . . no sacrifice we can make should be too great.

So if you want to be able to enjoy the good things of life in the peaceful days to come . . . if you want to speed victory and thus save the lives of thousands of fighting men . . . start doing these seven things now . . .

**1. Buy only what you *need*.** Take care of what you have. Avoid waste.

**2. Don't try to profit from the war.** Don't ask more than you absolutely *must* for what you have to sell . . . whether it's *goods* or your own *labor* you're selling.

**3. Pay no more than ceiling prices.** Buy rationed goods only by exchanging stamps. Otherwise, you're helping the black-market criminals, hurting yourself and all other good Americans.

**4. Pay taxes willingly.** They're the cheapest way of paying for the war.

**5. Pay off your old debts**—all of them. Don't make new ones.

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**HELP US KEEP PRICES DOWN**

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AMERICAN
DYESTUFF REPORTER

VOLUME 33 APRIL 24, 1944 NUMBER 9

# Spectrophotometric Prediction of COLOR OF WOOL BLENDS*

E. I. STEARNS and F. NOECHEL

## SUMMARY

**A relation has been empirically found by the use of spectrophotometric data which permits the prediction of reflectance of mixtures of wool fibers from known reflectances of the components.**

## INTRODUCTION

THE many intricate problems facing the top dyer when he strives to match a standard shade seem to be insurmountable. The ability shown by the dyers in accomplishing this matching is truly a remarkable achievement. The uninitiated, as well as those familiar with the art of dyeing, wonder at the proximity to which standards are met by visual matching.

Developments of the Visual Spectrophotometer during the past few years have made it possible, not only to determine the agreement of two samples, but to determine most of the factors responsible for any variance from standard.

## TOLERANCES

The spectrophotometer can be used advantageously in determining tolerances within which a color sample should fall and still be considered a good match. Dyers, in striving for the closest possible match, are sometimes overzealous, thereby overcorrecting for shade. This condition, in turn, must be rectified. It will be readily recognized that the importance of definite tolerances cannot be stressed too much.

Maximum tolerances within which a color sample should fall can, perhaps, be set up by visual inspection alone. Such a procedure would entail having a group of persons, familiar with "shading-off," examine a number of samples of different deliveries of the same color and agree as to which samples should be taken for maximum limits. Future deliveries would then have to fall within these tolerances for acceptance.

Perhaps the greatest difficulty for a successful culmination of this plan is the variability of light. Several artificial daylight lamps have been developed. [1]Although these are helpful, it is too often found that when the color of two samples agrees under these illumination devices, the color may not match under daylight conditions. When samples are compared by the Visual Spectrophotometer and the curve shapes agree, samples will match both under daylight and tungsten. It can, therefore, be seen that color tolerances can be determined with much better accuracy by the Visual Spectrophotometer than by eye alone.

Man is always striving to improve, thus every mill will try to narrow its tolerances. Since it is almost impossible to judge small percentage differences by eye, the Visual Spectrophotometer can be of exceptional value in the determination of these differences. It is frequently found that new deliveries are rejected although the variations within samples, or between samples, of the previous deliveries were greater than the differences from one delivery to another.

If tolerances are set in such a way that more than 5% of normal deliveries are rejected, the tolerances are undoubtedly too close for a satisfactory measure of acceptance or rejection. Here the Visual Spectrophotometer will be of great assistance to the dyer in measuring past performance for the establishment of tolerances thus greatly minimizing "corrections" which are, too often, not necessary for good average mill practice.

## FACTORS INFLUENCING SHADE

Individual dyers are familiar with the numerous factors affecting the ultimate dyeing result. Some of these factors have been measured and proven by the application of the Visual Spectrophotometer. The affinity for dyestuff is a great variable in wool. If two lots of the same origin but of different diameter are dyed together, the shade will vary or differ as illustrated in Figure 1 (A & B). When wools of the same grade but of different origin are dyed together, the shade will vary as illustrated in Figure 2 (C & D). Although large differences can be determined visually, the spectrophotometer will greatly aid in the measuring of these, thereby forecasting differences to be expected before the dyeing of a particular lot is begun.

*A joint contribution of the Research Department, Calco Chemical Division of American Cyanamid Co. and the Physical Laboratories, Botany Worsted Mills.

[1]N. Macbeth, Amer. Dyes. Rptr. *30*, 615 (1941).

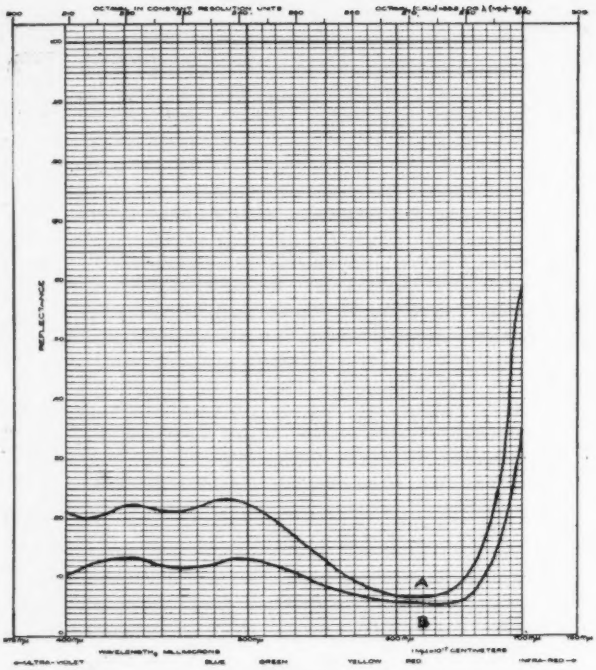


**Figure 1**
**Effect of Fiber diameter**
**1.2 per cent Dyeing of Naphthol Blue Black (CI 246) on alkali treated wool.**
**A—64's**
**B—36's**

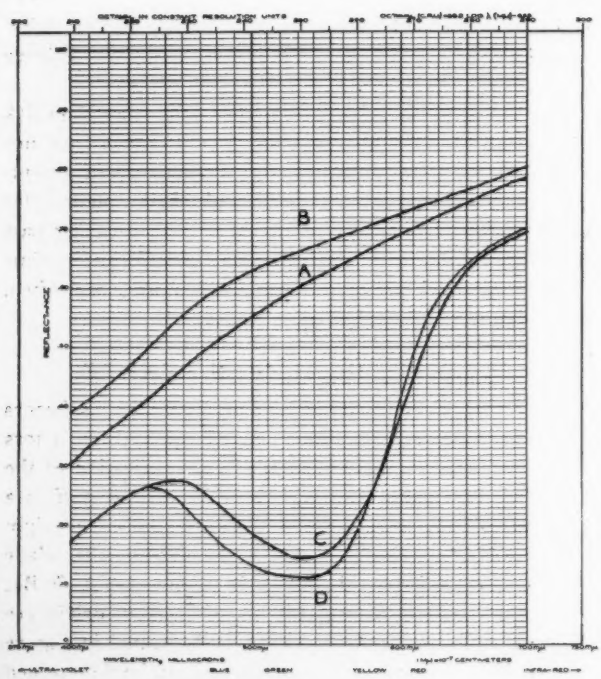


**Figure 2**
**Effect of Origin of Wool**
**A—Virginian Wool undyed**
**B—Territory Wool undyed**
**C—Virginian Wool dyed red**
**D—Territory Wool dyed with same formula as C**

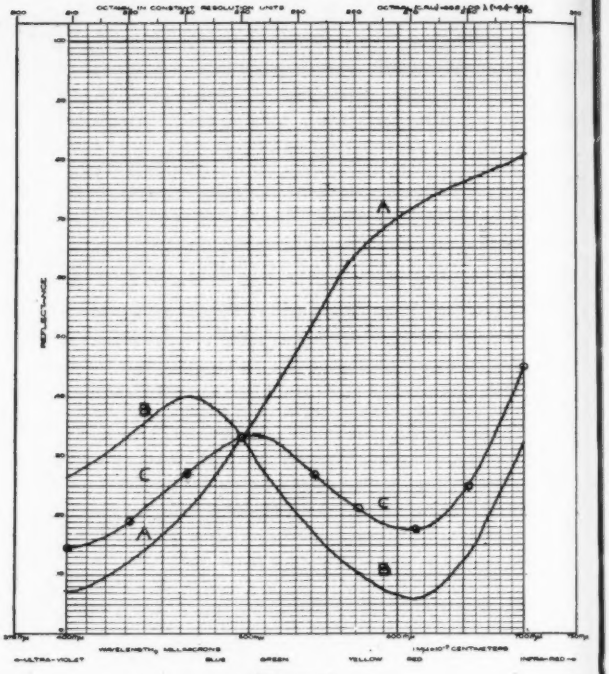


**Figure 3**
**Blend of Yellow and Blue Wool**
**A. Yellow Wool**
**B. Blue Wool**
**C. Mixture in equal proportions**
**Circles indicate predicted reflectance of the mixture.**

Most dyers are familiar with "Dyeing Randomness" which so often causes variabilities in the ultimate shade. The spectrophotometer is designed to aid in detecting this "Dyeing Randomness." Corrections can, in most cases, be made by the use of proper dyeing kettles which should preferably be equipped with temperature controls.

It is quite possible to use the Visual Spectrophotometer for every day application in the dyeing and color matching of wool blends. It should be kept in mind that a fairly large amount of research is needed on past and present performance for the most efficient operation.

## DETERMINATION OF THE MIXTURE THEORY

Spectrophotometric measurements have been made of various components and mixtures of colored wool in order to determine what relation may be used to predict the color of the mixture and, therefore, be able to direct the formulating of these blends with the VS (visual range spectrophotometer).

Figure 3 shows the VS (visual range spectrophotometric) curves of a blue wool (B), a yellow wool (A) and a mixture (C) in equal proportions of the two. The wool was of a fine grade, having an average fiber diameter of 22 microns, and was measured in the form of slubbing. The two colors were mixed in a gill and were passed through the gilling machine until further passes did not change the VS curve. It will be noted that at all wavelengths the reflectance of the mixture falls between the

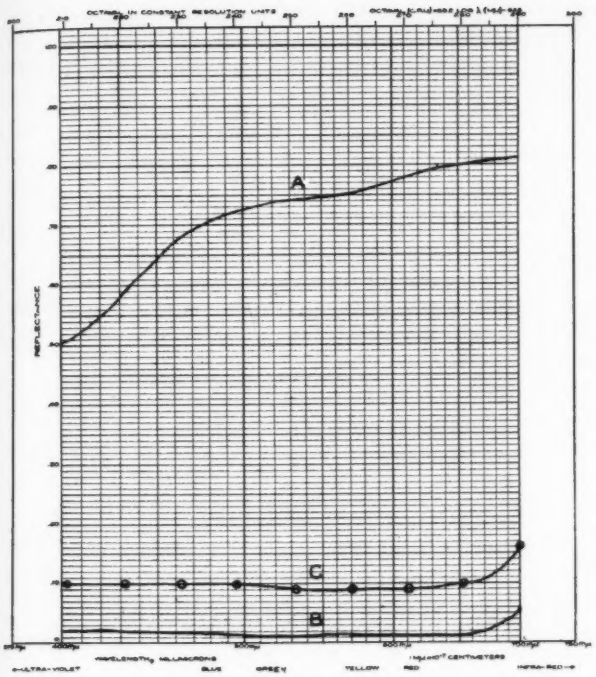


**Figure 4**
**A. White Wool.**
**B. Black Wool**
**C. Mixture of equal proportions**
**Circles indicate predicted reflectance of mixture.**

reflectance of the components but it will also be noted that the reflectance of the mix is in no case an average of the reflectances of the two components except at the point where the curves cross.

Figure 4 shows the VS curves of a black wool (B), a white wool (A), and a mixture (C) of equal proportions. Here again it is evident that the reflectance of the mixture is not an average of the reflectance of the two lots. If a lot of black wool reflecting one per cent light and a lot of bleached wool reflecting 80% (at 650 mu) are mixed in various proportions, the reflectances plotted against the proportions will give curve A as shown in Figure 5A. Figure 5A may thus be considered as a mixture which applies to a particular size wool, a particular color, and a particular wavelength. This curve represents a simple case of the relation according to which reflectance should be additive or computable.

For use on a spectrophotometer a special cam following the hyperbolic equation

$$f(R) = \frac{100 - R}{b(R-1)+1}$$ where R = body reflectance (%)

and

b = constant = 0.15 for wool

has been designed by one of the authors and it plots the additive function f(R) in the useful form of a straight line (Figure 5B).

Experiment has shown that in a plot having this ordinate scale not only will data at 650 mu fall on a straight line, but data at other wavelengths from 400 to 750 mu also

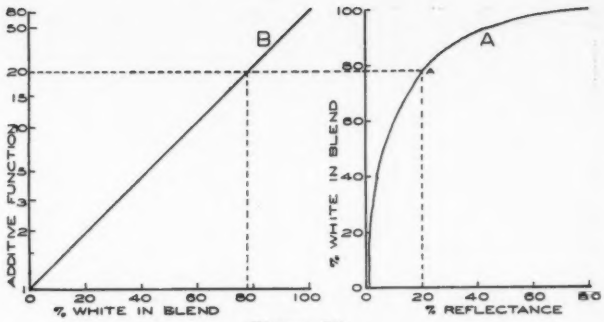


**Figure 5A**
**Empirical relation between reflectance and proportion of white wool of 22 micron diameter in blend of black and white at 650 mu.**
**Figure 5B**
**Data of Figure 5A replotted with special ordinate to give a straight line relation.**

fall on a straight line. Experiment has also shown that in mixtures of other colors than black and white a straight line is obtained and hence the same law applies to various reflectance values. Further, the size of the wool has been varied from 22 microns (64's) to 32 microns (quarter blood) and straight lines were found in all cases. Hence this chart may be used generally for wool blending problems.

## EXPERIMENTAL VERIFICATION OF THE MIXTURE THEORY

Using this function, predictions have been made for the blends of Figures 3 and 4. The predicted values are the circles on these figures.

Figure 6 presents the individual curves and the mixture curves of a commercial olive drab sample. In this case, a gold wool (A), a green wool (B) and a white wool (C) are mixed together in the percentage of 37% gold, 31% green and 32% white. The predicted points are shown in circles in the figure and it is evident that they are in close agreement with the curve of the mixture (D).

## ALTERNATIVE METHOD OF PLOTTING

When data are plotted on the basis of a cam linear in the additive function rather than linear in reflectance, an easily interpreted curve is obtained. The data of Figure 3 have been replotted in Figure 7 using an ordinate of this type. The curve shape obtained is vastly different but it will be noted in Figure 7 that Curve C, which is a 50-50 mix of Curves A (Blue) and B (Yellow), is at all points exactly half way between Curves A and B on a linear basis.

## FORMULATING IN PRACTICE

While the above additive function will permit an exact prediction of the VS curve of a mixture, this is only one phase of the commercial application of VS formulating. There are two steps involved. Exact predictions of VS curves can be made with the relationship developed above. Exact analysis of the significance of VS curves in visual terms can be made with the colorimetric procedures outlined by Hardy[2]. To combine these two and predict the

[2] A. C. Hardy, Handbook of Colorimetry, The Technology Press (1936).

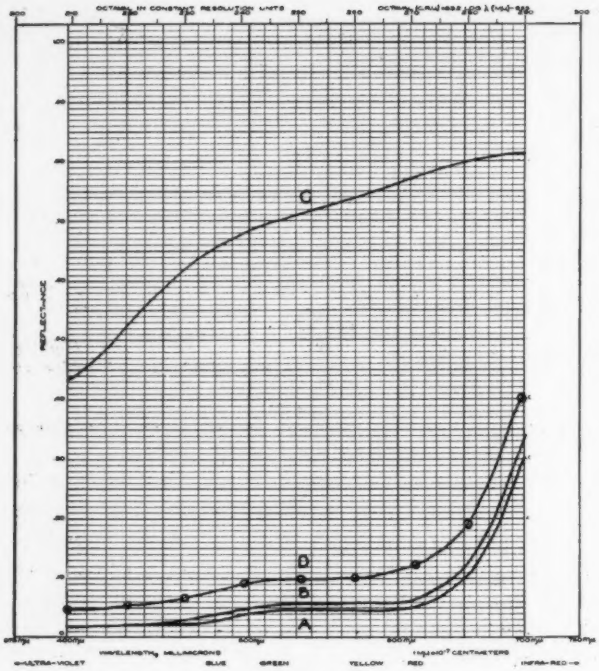


Figure 6
U. S. Army Olive Drab Mixture
A. Gold Component
B. Green Component
C. White Component
D. Mixture to match Army Standrad
Circles indicate predicted reflectances of mixture

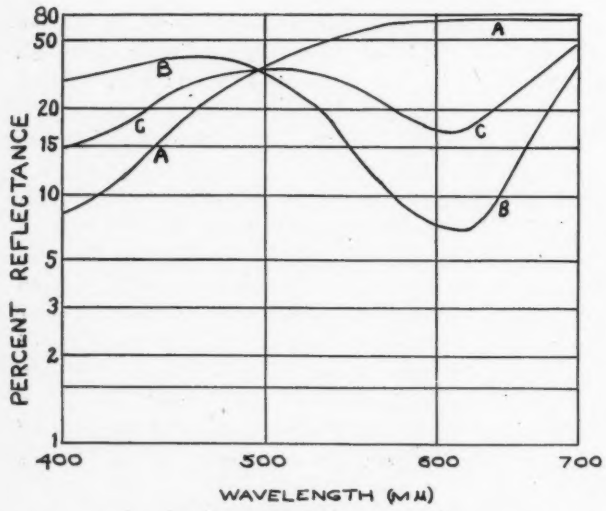


Figure 7
Data of Figure 3 plotted with special ordinate so that mixture C falls equally distant from Yellow A and Blue B.

visual effect of a formulating change requires use of an approximation method outside the scope of this paper. Park[3] and Duntley[4] have proposed to formulate with tri-stimulus data. Park's method is not particularly applicable to the mixing of fibers because the empirical relations of tri-stimulus values to concentration which are necessary for determining his nominal strengths can only be determined on the one side since white fibers can be added to determine lower concentrations but cannot be subtracted to get higher concentrations. Also the empirical data needed for each standard are laboriously obtained. Duntley's method incorrectly assumes that reflectances are additive and using it he obtained commercially satisfactory matches only for samples with small color differences and similar dye components but failed to predict results in the case of blending widely differing batches such as occur in olive drab army cloth mixes except by introducing a factor which is dependent upon the reflectance. This, of course, disproved his fundamental assumption of additive reflectances.

In practice, we have worked with three different reflectances representing, roughly, the absorption maximums of the three dyes present in largest quantity to make the shade, and when the mix agreed with the standard at these three wavelengths, the sample was quite close. Typical differences were of the order of 1 Judd unit calculated in the conventional manner.[5]

[3] R. H. Park, Amer. Dyestuff Reptr. *29*, 278 (1940).
[4] S. Q. Duntley, American Dyestuff Reporter, *30*, 698 (1941).
[5] D. B. Judd, Textile Research *9*, 292 (1939).

## Division of Cellulose Chemistry of the AMERICAN CHEMICAL SOCIETY

*Abstracts of Papers Presented at Cleveland, Ohio, April 3 to 7, 1944*

### E. BERL, Presiding

#### THURSDAY MORNING

9:00—1. *Introductory Remarks.* E. Berl.

9:30—2. *The Chemical Nature of Redwood Tannin and Phlobaphene.* M. A. Buchanan, H. F. Lewis, and E. F. Kurth, The Institute of Paper Chemistry, Appleton, Wis.

Tannin and phlobaphene have been isolated from redwood (*Sequoia sempervirens*) and a study of their chemical nature has been made.

Stumpwood in the form of sawdust was extracted with acetone. On pouring the concentrated acetone extract into water the phlobaphene separated as a solid, whereas the tannin remained in solution. The phlobaphene was purified by dissolving in acetone and reprecipitating into water. The reprecipitated product was extracted with ether and, for analysis, was further purified by dissolving in dioxane and precipitating into ether.

The tannin was first purified by precipitating with lead acetate, decomposing the lead salt with hydrogen sulfide. The tannin was precipitated from the resulting solution by means of sodium chloride. It was further purified by extracting with acetone, and extracting the acetone-soluble portion with ether; for analysis the material was dissolved in dioxane and precipitated into ether.

Both the tannin and the phlobaphene were acetylated and also methylated with dimethyl sulfate and sodium hydroxide and with diazomethane in anhydrous dioxane. The methoxyl contents indicate the amount of total hydroxyl groups and phenolic groups. The purified tannin contains 2.8 per cent methoxyl, 62.0 per cent carbon, 6.2 per cent hydrogen, 15.2 per cent phenolic groups, and 20.0 per cent total hydroxyl groups. The purified tannin still contains 24 per cent of material which is not adsorbed by hide

***(Concluded on Page 192)***

PROCEEDINGS OF THE

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APRIL 24, 1944

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Members should notify the **Secretary** immediately of all address changes.

# The Relation of the NATIONAL BUREAU OF STANDARDS to the Textile Industry*

**WM. D. APPEL**
*Chief, Textile Section, National Bureau of Standards*
*President of the American Association of Textile Chemists and Colorists*

A VISITOR to the National Bureau of Standards seeking information about its services to the textile industry would be directed to the Textile Section of the Division of Organic and Fibrous Materials. There he would find the textile research and testing activities of which I propose to speak briefly. But first, to present these activities in the proper perspective, something should be said about the general functions and organization of the Bureau.

## GENERAL FUNCTIONS AND ORGANIZATION

As you know, the National Bureau of Standards is a part of the Department of Commerce. It was established in 1901 by act of Congress, which placed in its custody the standards on which the weights and measures of the country are based, and charged it with the development and maintenance of the reference and working standards used in science, engineering, industry, and commerce, and the determination of physical constants and properties of materials. Thus the weight of the cotton or wool or dyestuffs you buy, and the yardage of the yarn or cloth you sell, are based upon the mass of one piece of platinum-iridium alloy in a vault at the Bureau and the length of another. The electricity coming to your plant, your water supply, the pressure in your boilers, the temperature of your dye baths, mercerization ranges, and dryers are all measured with instruments which have been calibrated either directly or indirectly with standards maintained at the Bureau, and by methods which it has developed or approved. These services and many others reach all manufacturers, and in fact practically everyone in the country.

The staff of the Bureau, which numbered one thousand members before the war, is distributed among twelve divisions and the office, power plant, and shops. Nine of the divisions are concerned with scientific and technical research and testing, and three are concerned with commercial standardization. All of these divisions touch the textile industry in some way. One of the unique advantages of working on textiles at the Bureau is the background of experience which is available through these divisions, and the advice and collaboration of their expert chemists, physicists, and engineers. Some examples of how the scientific and technical divisions of the Bureau not primarily concerned with textiles as such, have served the textile industry, may be of interest.

## SERVICES OF THE SCIENTIFIC AND TECHNICAL BRANCH

The Electricity Division has equipment for testing electrical insulation and is concerned with the uses of textiles as coverings for electric wires and cables, in motors and other electrical equipment. The high voltage laboratory in that Division has studied the electrical characteristics of ropes for use by linemen and for towing gliders under conditions which would develop in an electrical storm.

The Division of Weights and Measures works closely with State and municipal weights and measures officials. Recently trouble arose over the weights of hand-knitting yarns in retail stores, and the Division was able to suggest a practical way for the hand-knitting yarns industry to avoid the trouble when representatives of the industry came to the Bureau for help.

The Heat and Power Division has helped with the development of methods for measuring thermal transmission or "warmth" of textiles. Its Fire-Resistance Section is concerned with the fire hazards of textiles and has studied methods of fireproofing them. The Lubricants and Fuels Section has furnished oils of specified fluidities for calibrating viscosimeters for measuring fluidity of cellulose in cuprammonium, which is the most sensitive measure we have of the degree of degradation of cotton and rayon in light, laundering, bleaching, etc.

The Colorimetry Section of the Optics Division has pioneered in the measurement of the color of textiles and dyes, as well as other materials, and has worked closely with the Textile Section on color problems. Workers in the fields of spectrophotometry and colorimetry all come to the Colorimetry Section for advice and inspiration.

The Chemistry Division has numerous contacts with textiles. Its work on the measurement of hydrogen-ion concentration has involved a study of dyes as indicators, and its findings are applicable in the control of the wet processing of textiles. The work on accelerated weathering of paints and roofing materials resulted in the develop-

* Presented at meeting, Piedmont Section, March 25, 1944.

ment of weather-ometers, which are now much used in testing textiles. The development of coating materials to render cloth impervious to hydrogen and helium, for use in dirigibles, is undertaken in the Chemistry Division.

Large ropes which cannot be tested on ordinary textile equipment, and sound absorbing fabrics, are tested in the Division of Mechanics and Sound.

The Division of Metallurgy has answered our questions concerning metallic corrosion in mills—for example, the corrosion of knitting needles in hosiery mills.

The Glass Section of the Clay and Silicate Products Division is concerned with some of the problems involved in the manufacture and use of glass textiles.

## SERVICES OF THE COMMERCIAL STANDARDIZATION BRANCH

The services of the commercial standards divisions of the Bureau may be familiar to you.

The Division of Simplified Practice undertakes to help industrial and commercial groups in reducing waste through eliminating needless varieties of product, method, or practice. Its function is to bring together all parties interested in a project of this character and to coordinate their work in developing a simplified practice recommendation. Simplified Practice Recommendations have been promulgated for cotton duck, sizes of red blankets, mattresses, adhesive plaster, surgical gauze, surgical dressings, hard-fiber and soft-fiber twines and cotton twine, dimensions of cones for warp and knitting yarns, and hole sizes for bobbins for filling cop winders, hole sizes for taper tubes for filling cop winders, cotton Canton flannel, and cotton jersey cloth for work gloves, cloth window shades. The Division of Simplified Practice is serving the War Production Board in an advisory capacity. The industry's experience with mandatory simplification of products under the War Production Board may indicate the desirability of developing voluntary Simplified Practice Recommendations to take the place of mandatory orders when those orders have been revoked.

Nearly everyone in the textile industry has heard of Commercial Standard CS-59-44, Textiles, Testing and Reporting, if not, of the nineteen other Commercial Standards relating to textiles developed by the industry with the cooperation of the Trade Standards Division of the Bureau. This Division will, on request, assist in the voluntary establishment of standards covering grades and qualities as a national basis for marketing manufactured commodities. The Division functions chiefly as a neutral agency to see that all interested elements are given full opportunity to be heard and to be satisfied, to solicit and record acceptances and to promulgate and publish the Standard when a satisfactory majority of acceptances is obtained, and provided there is no active opposition. Commercial Standards have been promulgated for book cloths, buckrams, and impregnated fabric for book-binding purposes; boys' button-on waists, shirts; junior and sports shirts; boys' pajamas, men's pajamas; cotton cloth for rubber and pyroxylin coating; cotton fabric tents, tarpaulins, and covers; cotton and rayon velour; mohair pile fabrics; dress patterns; moisture regains of cotton yarns; woven elastic fabrics for use in overalls; hosiery lengths and sizes; knit underwear; mattresses for hospitals and for institutions; methods of analysis and of reporting fiber composition of textile products; grading of sulfonated oils.

The Division of Codes and Specifications promotes and facilitates the use and unification of codes and specifications. It compiles lists of sources of supply of materials guaranteed to comply with nationally recognized standards and specifications for the benefit of buyers and sellers.

## TEXTILE RESEARCH AND TESTING

As I have already indicated, the Textile Section of the Bureau is in the Division of Organic and Fibrous Materials, which includes sections on Rubber, Paper, Leather, and Plastics. Its work is directed along lines of importance to Federal and State governments, industry, and the general public. Most of the work is of importance to all three groups. At present the Section is working almost exclusively on problems presented by the military and other war agencies of the Government.

The Bureau tests textiles purchased by Government agencies on request, and helps the technical committees of the Government write the specifications under which they are purchased. Some fifteen hundred samples of textiles are tested at the Bureau each month.

Special attention has been given to research on methods of measurement and measuring instruments for textiles and their standardization, and to the development of criteria of quality and performance of textile products. By providing new tools for the study of textiles and for the control of textile processing, the Bureau has been able with a small staff to promote research and development work throughout the industry, with the resulting increase in value of textile products for the benefit of both public and private users.

Among the instruments for evaluating textiles which have originated at the Bureau are: The compressometer, flexometer, planoflex, Dreby friction meter, Kline-Schiefer tautness meter, the National Bureau of Standards carpet wear testing machine, the Schiefer (so-called "Frazier") hosiery testing machine, the National Bureau of Standards equipment for measuring air permeability and thermal transmission of fabrics. All of these have contributed, or are contributing, to our knowledge of textiles in many laboratories throughout the country.

The importance attached by the Bureau to *performance* as opposed to composition of textiles is reflected in the fact that all of the instruments referred to above evaluate characteristics related to performance. However, the Bureau has developed methods of analysis for fiber composition and chemical methods for evaluating textiles. These

methods are the basis for some of the widely-used standards of the industry.

Study of the fundamental properties of textile fibers and of the substances composing them has been the special field of the Research Associateship maintained at the Bureau by the Textile Foundation. The excellent work of this group of scientists has released Bureau personnel for other duties. Problems relating to the utilization of surplus materials and the development of processes and methods of fabrication fall within the scope of the work of the Bureau, although work of this nature on textiles has been limited.

The Bureau cooperates fully with national associations interested in textile research and standardization. Its experience and leadership have been utilized in peace time through the Research Associate Plan, by which national associations may support research at the Bureau on problems of general interest. Among the associations which have taken advantage of this arrangement are: The A.A.T.C.C., The American Society for Testing Materials (Committee D-13 on Textiles), The Textile Foundation, The Textile Research Institute, The Underwear Institute, Cordage Institute, Cotton Textile Institute, and National Association of Dyers and Cleaners. The results of this cooperative research become public property and are published in Government publications or in the technical press.

In addition to the researches of strictly military and confidential nature now in progress, the Bureau is engaged in developing methods for evaluating the basic properties of cordage fibers and in applying these methods to proposed substitutes for fibers which are no longer available in sufficient quantity because of the war. Ropes made from substitute fibers are being investigated. A standard lamp for testing fastness to light, against which the lamps used in other laboratories may be calibrated, is being installed. The Bureau is attempting to coordinate the efforts to standardize tests for mildew resistance of textiles and methods for the accelerated weathering of textiles which are in progress in a number of laboratories, both Government and private.

## HOW RESULTS ARE MADE AVAILABLE

The scientific and technical results of the Bureau's work on textiles are made available through personal interviews, correspondence, national committee work, and publication. Perhaps the best way to keep abreast of the work in progress is through a subscription to the *Technical News Bulletin*. It contains abstracts of all papers in the National Bureau of Standards *Journal of Research*, brief accounts of work in progress, and a list of all papers by members of the staff, whether published in Bureau or outside publications. Reprints of individual reports in the Journal are made available as separate Research Papers. These papers, and a complete list of Bureau publications (Circular No. 24 and Supplements), with index and abstracts, are available by purchase from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. The Bureau's papers are also available for reference purposes at the principal Government depository libraries of the country, and in most of the libraries of scientific and technical colleges and societies.

The published technical and scientific papers relating to textiles by members of the staff of the Bureau number over four hundred.

In conclusion, I should like to mention two other ways in which the Bureau has contributed very materially to progress in the field of textiles. The first is as a sort of school for graduate training. Among the men who have left the Bureau and taken important places in the industry are: E. Dean Walen, Agent of the Worsted Division of the Pacific Mills; Russel Fisher, President of the National Association of Cotton Manufacturers; Charles Schoffstall, formerly head of the laboratories of Marshall Field and Co., and now with the U. S. Tariff Commission; Charles J. Huber, formerly vice-president and General Manager of the United States Testing Company and now Director of Research for Johnson and Johnson.

The second is as a catalyst for textile research. The Bureau has pioneered many fields which have then been developed by others. The Research Associateship on dry cleaning at the Bureau developed into the National Association Institute of Dyers and Cleaners. The A.A.T.C.C. Research Associateship was taken over by the Textile Foundation with an increase in personnel to a dozen or more workers, and the Foundation's staff is scheduled to become the nucleus of the fundamental research staff of the Textile Research Institute to be set up at Princeton University after the war.

Thus with a very small staff, limited facilities, and a modest expenditure of public funds for textile work, the Bureau has been able to make a sizable contribution to the textile industry.

## MEETING, RHODE ISLAND SECTION

THE last meeting for this season of the Rhode Island Section was held on March 31st at 8:00 P.M. at the Providence Engineering Society hall. Howard King, Chairman, called the meeting to order and asked for reports from the Secretary and Treasurer. Robert W. Joerger and Robert R. Farwell responded briefly. The Nominating Committee for a revised slate of officers was then called and its Chairman, Ralph F. Culver, presented a list which was duly voted in by the members present. The officers for the coming year will be:

*Chairman*.....Harold B. Sturtevant
*Vice-Chairman*...George H. Wood, Jr.
*Secretary*.....Robert W. Joerger
*Treasurer*.....Robert R. Farwell
*Councilors*. Ben Verity, Howard V. King
*Sectional & Program Committee*
Peter J. Ariente, Elliot Broadbent, Kenneth C. Everett, Allison R. Fletcher, Charles F. E. Sedgwick, William M. Thornton.

Mr. King then introduced the speaker, D. J. Campbell, Manager of the Peroxygen Products Sales Research & Service of E. I. du Pont's Electrochemical Division at Niagara Falls, New York. His lecture on "Procedure and Equipment for Bleaching of Cotton Goods with the Peroxide Continuous Method" included both a resume of the chemicals involved and the equipment used, both illustrated by charts and slides. This authoritative account was well received and a lively question-and-answer period followed. The meeting of 250 members and friends adjourned with a rising vote of thanks to the speaker at 10:00 p.m.

Respectfully submitted,

ROBERT W. JOERGER, *Secretary.*

## MEETING, PIEDMONT SECTION

THE Piedmont Section held their Spring meeting at the Poinsett Hotel, Greenville, South Carolina on Saturday, March 25, 1944.

A joint luncheon meeting of the officers of the Piedmont Section and the special executive committee on research of the National Association was held in the small dining room of the Poinsett Hotel. The following were present:

Officers—Piedmont Section: Henry B. Dixon, Chairman; L. G. Atkins, Secretary; Wyss L. Barker, Treasurer; Raphael E. Rupp, Councilor; C. Norris Rabold, Councilor.

Research Committee: Leonard S. Little, Wm. D. Appel, P. J. Wood, J. Robert Bonnar, Thomas R. Smith.

The technical session convened at 3:00 p.m. and covered round table discussions on cotton piece goods preparation and dyeing, which was conducted by R. H. Mathewson of the Union Bleachery, Greenville, South Carolina. R. H. Smith, Superintendent of Melrose Hosiery Mills, High Point, North Carolina led the discussion of dyeing and finishing of hosiery.

Our 20th Anniversary program and banquet was held in the main ballroom of the Poinsett Hotel at 7:30, at which time all the past chairmen of the Piedmont Section were honored. Arthur R. Thompson was chairman of the Anniversary program and presented all past chairmen and those present who were at the innaugural meeting which was held at the Imperial Hotel in the Fall of 1924.

Attached hereto is a full report on this phase of the program which has been prepared by Arthur R. Thompson.

After the banquet our National President, Wm. D. Appel, presented a paper "Relations of the National Bureau of Standards to the Textile Industry."

Hyman H. Field, sectional committeeman, was chairman of the arrangements committee and was responsible to a great extent for the success of this meeting. The attendance was 223.

Respectfully submitted,

L. G. ATKINS, *Secretary.*

## 20th ANNIVERSARY PROGRAM, PIEDMONT SECTION

THE Piedmont Section honored the past chairmen and those present at the inaugural meeting twenty years ago, at the regular Spring meeting in Greenville, South Carolina at the Poinsett Hotel, March 25th. Sixteen of the twenty past chairmen were present. Professor C. S. Doggett (deceased) chairman in 1926 and '27, Paul F. Haddock (deceased) chairman in 1934 and '35, H. A. Barnes, Chairman in 1927 and '28, and Chester L. Eddy, chairman in 1935 and '36, were the only past chairmen who were not present.

Those present on the 20th Anniversary, who were also present at the inaugural meeting in Greenville, South Carolina, October 1924, included R. W. Arrington, Malcolm Mackenzie, John David Hunter, N. R. Vierra, W. D. Shields, and A. R. Thompson, Jr.

The following past chairmen served the Piedmont Section with distinction and honor during their terms of office as shown below:

| | |
|---|---|
| Brown Mahon | October 1924-January 1925 |
| Harold M. Chase | January 1825-October 1925 |
| L. S. Little | 1925-1926 |
| Prof. C. S. Doggett | 1926-1927 |
| H. A. Barnes | 1927-1928 |
| Charles E. Mullin | 1928-1929 |
| R. M. Mitchell | 1929-1930 |
| S. L. Hayes | 1930-1931 |
| J. L. Crist | 1931-1932 |
| A. R. Thompson, Jr. | 1932-1933 |
| George P. Feindel | 1833-1934 |
| Paul F. Haddock | 1934-1935 |
| Chester L. Eddy | 1935-1936 |
| T. R. Smith | 1936-1937 |
| Dr. R. E. Rupp | 1937-1938 |
| A. Henry Gaide | 1938-1939 |
| H. E. Kiefer | 1939-1940 |
| Louis M. Boyd | 1940-1941 |
| T. W. Church, Jr | 1941-1942 |
| C. Norris Rabold | 1942-1943 |

Letters were received from the following, who were unable to attend the 20th Anniversary program ceremonies: Dr. E. H. Killheffer, who was the national officer officiating at the first meeting of the Southern Section, Peter F. O'Neill, J. Gordon Stott, Chester L. Eddy, H. A. Barnes, Charles H. Stone, John H. Carey, and Major W. D. Smith, C.W.S.

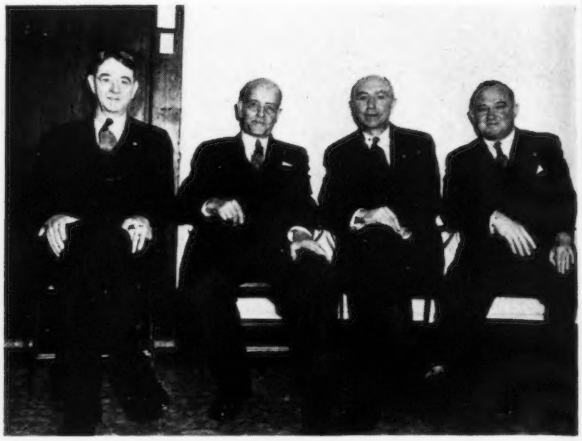
A. R. THOMPSON, JR.
*Publicity Chairman.*

*Note: Photographs taken at the twentieth anniversary meeting of the Piedmont Section appear on the next page.*

# *Twentieth Anniversary Meeting*
# OF THE PIEDMONT SECTION

***Poinsett Hotel, Greenville, S. C., March 25, 1944***

Officers of the Piedmont Section (left to right): Wyss L. Barker, Treasurer; Sydney M. Cone, Vice-Chairman; Henry B. Dixon, Chairman; Leland G. Atkins, Secretary; Hyman H. Field, Sectional Committee-man in charge of Greenville meeting.



Past Presidents of the National Association (left to right): P. J. Wood; William H. Cady, William D. Appel (present president); Thomas R. Smith.

Past Chairmen of the Piedmont Section (left to right): Front Row—A. R. Thompson, Jr.; R. M. Mitchell; H. M. Chase; Brown Mahon; Leonard S. Little; C. Norris Rabold; T. W. Church, Jr.; Back Row—S. L. Hayes; John L. Crist; George P. Feindel; T. R. Smith; Dr. R. E. Rupp; A. Henry Gaede; H. E. Keifer; Louis M. Boyd.

## MEMBERSHIP APPLICATIONS

### *Senior*

*Annis G. Assaf* — Research Chemist, Consultant, Mass. Inst. of Tech.—Wm. E. Wright & Sons, Cambridge, Mass. Sponsors: C. W. Dorn, E. Driscoll.

*Arthur E. Bartlett*—Director of Technical Service, Nuodex Products Co., Inc., Elizabeth, N. J. Sponsor: T. J. Bowes.

*Richard W. Bower*—Piece Goods Dyer, Continental Mills, Inc., Germantown, Pa. Sponsors: R. Lukens, H. C. Haller.

*Earl S. Bullock*—Technical Representative, Eaton-Clark Co., Detroit, Mich. Sponsors: R. P. Cole, S. V. Cottrell.

*George B. Chabot*—Colorist, Calco Chemical Div., American Cyanamid Co., Bound Brook, N. J. Sponsors: W. H. Watkins, H. E. Millson.

*Richard S. Cox*—Dean, Philadelphia Textile Institute, Philadelphia, Pa. Sponsors: C. A. Seibert, R. E. Rose.

*Irvin F. Diamond*—Overseer, Dyeing, Cold Spring Bleachery, Yardley, Pa. Sponsors: B. C. Bond, A. E. Raimo.

*Richard M. Dorian*—Supt. & Engineer, A. & M. Karagheusian, Inc., Roselle Park, N. J. Sponsors: Wm. H. Kieffer, H. C. Millson.

*Walter R. Eastman*—Textile Chemist, United States Finishing Co., Norwich, Conn. Sponsors: G. F. Walz, W. H. Cady.

*Raymond K. Flege*—Chemical Engineer, The Kendall Company, Kendall Mills Finishing Div., Slatersville, R. I. Sponsors: H. B. Sturtevant, L. A. Stanley.

*John Fulmer* — District Manager, American Bleached Goods Co., Inc., Philadelphia, Pa. Sponsors: S. G. Davenport, E. W. Walls.

*Joseph Glover*—Superintendent, Heminway & Bartlett Mfg. Co., Watertown, Conn. Sponsors: W. E. Thompson, E. Young.

*Jesse Hey*—Overseer of Finishing, Empire Worsted Mills, Inc., Jamestown, N. Y. Sponsors: W. G. Crocker, J. S. Sargent.

*Mervin F. Hill*—Salesman & Technician, F. P. Maupai Dyeing Co., West New York, N. J. Sponsors: T. J. Lannaghan, W. F. Brosnan.

*Paul T. Jones*—Research Chemist, American Bemberg Corp., Elizabethtown, Tenn. Sponsors: J. H. Ewing, G. W. Searell.

*Beverly M. Keever*—Finisher, N. C. Fabrics Corp., Salisbury, N. C. Sponsors: W. L. Barker, K. Mackenzie.

*Joseph A. Kelly*—Dyer, Frankford Woolen Mills, Philadelphia, Pa. Sponsors: A. E. Raimo, R. B. Stehle.

*Julian G. Kilroy*—Boss Dyer & Superintendent, Nicetown Dye Works, Philadelphia, Pa. Sponsors: F. A. Vellner, R. Robertson.

*Bernard Kushner* — Textile Colorist, Walmar Textile Printing Co., Long Island City, N. Y. Sponsors: R. C. Geering, C. G. Lederer.

*Harvey W. Lindley*—Dyer, Long's Finishing Mill, Burlington, N. C. Sponsors: R. H. Smith, H. B. Dixon.

*Robert L. Mauldin*—Overseer of Jig Dyeing, North Carolina Fabrics Corp., Salisbury, N. C. Sponsors: W. L. Barker, K. Mackenzie.

*James W. McCarty* — Instructor, Textile Engineering, Georgia School of Technology, Atlanta, Ga. Sponsors: C. A. Jones, G. B. Hale.

*Raymond F. McDonald*—Technical Representative & Demonstrator, Eaton-Clark Company, Detroit, Mich. Sponsors: R. P. Cole, S. V. Cottrell.

*Willard L. Mills*—Chemist, North Carolina Fabrics Corp., Salisbury, N. C. Sponsors: W. L. Barker, K. Mackenzie.

*Arthur P. Pelitsch*—Head Dyer, Native Lace Works, Inc., Hightstown, N. J. Sponsors: H. C. Spatz, R. H. Schweibert.

*John A. Ramsay*—Boss Dyer, North Carolina Fabrics Corp., Salisbury, N. C. Sponsors: W. L. Barker, K. Mackenzie.

*Jack W. Rembe*—Purchasing Agent, Cold Spring Bleachery, Yardley, Pa. Sponsors: B. C. Bond, A. E. Raimo.

*Claude I. Ruth*—Dye House Supt. & President of Company, W. G. Leininger Knitting Co., Mohnton, Pa. Sponsors: A. E. Raimo, A. K. Edwards.

*George W. Sarti*—Vice-President & General Manager, North Carolina Fabrics Corp., Salisbury, N. C. Sponsors: W. L. Barker, K. Mackenzie.

*Raymond Schaefer*—Dyer, Continental Mills, Philadelphia, Pa. Sponsors: R. Lukens, H. C. Haller.

*Otto E. Schmidt*—Overseer of Dyeing, Tilton Worsted Co., Inc., Laconia, N. H. Sponsors: C. H. A. Schmitt, F. H. Casey.

*Arthur Schneider*—Carpet Colorist, Masland Wilton Mills, Philadelphia, Pa. Sponsors: L. O. Koons, E. C. Dreby, 3rd.

*Mark G. Stern*—Technician, Ciba Co., Inc., New York, N. Y. Sponsor: T. F. O'Brien.

*Arthur Tanzer*—Textile Colorist & Chemist. Sponsors: V. Frolicher, H. L. Steen.

*Joseph E. Tobin*—Dyer, Hub Hosiery Mills, Lowell, Mass. Sponsors: F. H. Casey, G. Stewart.

*John J. Valter*—Supt., North Carolina Fabrics Corp., Salisbury, N. C. Sponsors: W. L. Barker, K. Mackenzie.

*Everett P. Ward*—Instructor, Textile Chemistry, Textile School, Clemson College, Clemson, S. C. Sponsors: S. L. Hayes, A. R. Thompson, Jr.

*Joseph Van Praagh*—Manager, Printing Div., Cold Spring Bleachery, Yardley, Pa. Sponsors: B. C. Bond, A. E. Raimo.

*Daniel F. Waters, Jr.*—Dyer, D. F. Waters & Sons, Inc., Philadelphia, Pa. Sponsors: C. C. Hagelgans, W. H. Bertolet, Jr.

*Robert H. Zeuren*—Supt. of Dyeing, International Looms of N. J., Elizabeth, N. J. Sponsors: H. C. Spatz, W. W. Barre.

### *Associate*

*Charles A. McGill*—Purchasing Agent, A. H. Rice Company, Pittsfield, Mass.

*John F. Sheehy*—Office Manager, Chemical Dept. Pacific Mills, Worsted Division, Lawrence, Mass.

### *Junior*

*Grace Heller*—Chemist, H. Kohnstamm & Co., New York, N. Y. Sponsors: J. G. Lukash, J. W. Scheuerman.

*Mildred A. Koen*—Research Chemist, Blackburn Products, Inc., Newark, N. J. Sponsors: C. Z. Draves, R. Faber.

### *Student*

*Vitaly Franco*—Georgia School of Technology. Sponsor: C. A. Jones.

*Benno Rothschild*—Georgia School of Technology. Sponsor: C. A. Jones.

### *Corporate*

Acme Finishing Co.
Alrose Chemical Co.
Apex Chemical Co.
Apponaug Co.
The Bell Co.
Berkshire Knitting Mills
Blossom Products Corporation
Bradford Dyeing Association
B Z B Knitting Co.
Celanese Corporation of America
Cold Spring Bleachery
Collins & Aikman Corporation
Enterprise Dye Works
W. F. Fancourt & Co.
Fouke Fur Co.
Franklin Process Co. and subsidiaries
Fruit of the Loom, Inc.
Hampton Co.
Thomas B. Harvey
Hayward-Schuster Woolen Mills
Hercules Powder Co.
Kenyon Piece Dye Works & Kenyon Finishing Co.
Massachusetts Mohair Plush Co.
Merrimack Manufacturing Co.
North Carolina Fabrics Corporation
Max Pollack & Co.
Princeton Worsted Mills
Providence Dyeing, Bleaching & Calendering Co.
Roanoke Mills Co.
Robertson Bleachery & Dye Works
Slatersville Finishing Co.
A. E. Staley Manufacturing Co.
M. T. Stevens & Sons Co.
Strutwear Knitting Co.
Watson Park Co.
O. F. Zurn & Co.

### *Applications for Transfer to Senior Membership*

*Stanley Backer*—Captain, Q.M.C., U. S. Army, Philadelphia, Pa.

*James E. Conway*—Salesman, Calco Chemical Div., American Cyanamid Co., Philadelphia, Pa.

*James Dixon*—Salesman, Calco Chemical Div., American Cyanamid Co., Philadelphia, Pa.

*Foster L. Pepper*—Salesman, Calco Chemical Div., American Cyanamid Co., Philadelphia, Pa.

*Sidney G. Smith, Jr.*—Plant Chemist, Security Mills, Inc., Newton, Mass.—Hamilton Mills, Inc., Yantic, Conn.

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## MEETING, PHILADELPHIA SECTION

THE Philadelphia Section held their meeting on April 14, 1944 in the Mirror Room of the Hotel Philadelphian.

Boyce C. Bond, Chairman, asked all members to remember our outing date on June 16, to be held at the Cedarbrook Country Club and the Annual Meeting in Atlantic City on October 12, 13 and 14.

Charles A. Seibert, Organic Chemicals Department, E. I. du Pont de Nemours & Company, Inc., spoke on the subject "Effect of the Fiber pH on the Light Fastness of Dyed Cotton." Dyed samples were on display to substantiate this topic. Several questions were asked and were satisfactorily answered by Mr. Seibert.

About 130 persons were present of which 104 attended dinner.

Respectfully submitted,

A. E. RAIMO, *Secretary*

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## CALENDAR OF COMING EVENTS

**Meeting, Mid-West Section, Schroeder Hotel, Milwaukee, Wis., May 6, 1944. Speakers: Charles Lennox, Research Laboratory, Swift & Co., "New Soaps of Domestic Origin"; J. P. Ditchman, Engineering Dept., General Electric Co., Nela Park, "The Drying of Textiles with Infra Red Radiation." Meeting—2 P. M.; Dinner—7 P. M.**

**Meeting, New York Section, Downtown A. C., 19 West St., New York City, June 9, 1944. (Business Meeting).**

**Annual Outing, Philadelphia Section, Cedarbrook Country Club, June 16, 1944**

**Meeting, South Central Section, June 16, 1944 (Tentative).**

**Meeting, Southeastern Section, Callaway Institute, La Grange, Ga., September 9, 1944 (Tentative).**

**Annual Meeting, Hotel Claridge, Atlantic City, N. J., October 12, 13 and 14, 1944. Auspices of Philadelphia Section.**

# THE USE OF CHLORINATED PARAFFIN

## in Rendering Fabric Resistant to Fire, Water, and Mildew

**A. E. IRVINE**
*Halowax Products Division,*
*Union Carbide and Carbon Corporation*

THE need for fabric treated so as to render it resistant to fire, water and mildew took a sharp upturn a few months before this country was forced into the second world war. Today, many lives among the several branches of our armed forces and millions of dollars worth of materials and equipment are being safeguarded with fire-, water- and mildew-resistant fabric treated with chlorinated paraffin.

Probably the greatest use for this treated fabric has been for the manufacture of the tents used to house our fighting men. Experience gained in the last war made necessary the precaution against fire commonly caused by such occurrences as overheated stove pipes, sparks, or by similar accidental origin. And now, the added dangers from incendiaries and fire-producing weapons made fire-retardant coverings more necessary than ever.

The need for motor covers in the frigid temperatures of our northern military bases has been met with treated duck. Under this protection motors can be safely warmed up without the usual fire hazard. Tarpaulins used to protect finished supplies are treated so as to reduce the danger of fire.

Among the great many other uses for this treated fabric are life jacket covers, covering for temporary hangars, and upholstery and tops for jeeps and trucks. Also, nets used to camouflage gun emplacements and equipment, as well as other military objects, are treated so as to reduce the damage ever present from fire.

There are several reasons why chlorinated paraffin is used in formulations to render fabric fire resistant. One reason is based on the general opinion that the chlorine-bearing gases evolved from the material when subjected to elevated temperatures prevent burning by surrounding the point of contact of the fire, thereby providing an oxygen-free atmosphere.

There has been much discussion concerning the types of chlorine-bearing gases that are formed when treated fabric is exposed to elevated temperatures. Some contend that the only gas (of fire-retardant quality) evolved is hydrogen chloride. Others seem to favor the opinion that the hydrogen chloride gas, evolved from the chlorinated paraffin, reacts with metallic compounds that are present in the formulation, thus forming metallic chlorides which are volatile at the temperatures involved in the burning of fabric. The results contained in Table I show the effect of various metallic oxides on chlorinated paraffin at elevated temperatures. From these results it is evident that antimony trichloride is formed. However, when these materials are together on fabric they are in the presence of carbon which would serve as a reducing agent for the antimony oxide. This reduction is easily carried out in the laboratory by dispersing antimony oxide on fabric.

It is generally acknowledged that chlorinated paraffin is a relatively unstable material. Also, it has been well established that various chemicals and conditions greatly accelerate the decomposition of the chlorinated product. Examples of the more reactive chemicals are iron, zinc and antimony, all of which are in use in one or more types of fabric application. Probably the most harmful condition to which chlorinated paraffin can be subjected is that of an elevated temperature. Therefore, when a compound containing chlorinated paraffin and one or more of the above-mentioned chemicals is subjected to an elevated temperature, rapid decomposition of the chlorinated material can be expected. This occurrence can easily be demonstrated in the laboratory by employing a test such as the stability test contained in the Jeffersonville Quartermaster Depot Specification 242.

Table I illustrates the decomposition rate of chlorinated paraffin in the presence of various metallic compounds.

It is believed by some workers that the effectiveness of the zinc compounds in reducing afterglow is due to the rapid and probably nearly complete decomposition of the chlorinated material at elevated temperatures.

If the fire-retardant property is due to the release from the fabric coating of hydrogen chloride, it follows that a greater source of hydrogen chloride would be desirable. The higher chlorinated paraffins offer a greater source of hydrogen chloride over the more commonly used 42-45 per cent type, and early work indicates that the additional chlorine adds to the effectiveness of the fire-retardant property. However, other conditions must be considered when using material in the higher chlorine content range, and some discussion on this will be made later in this paper.

**TABLE I**

Test conditions: As prescribed in J.Q.M.D. Spec. No. 242
Results: Expressed as the percentage of HCl evolved at the end of each hour for the four-hour test.

| *Sample* | *1st Hr. HCl* | *2nd Hr. HCl* | *3rd Hr. HCl* | *4th Hr. HCl* | *Total HCl* |
|---|---|---|---|---|---|
| Cl. par-(42-45%) Control ..... | 0.43% | 0.31% | 0.27% | 0.25% | 1.26% |
| Cl-par. plus 7% $PbCrO_4$ ..... | 1.70 | 0.51 | 0.37 | 0.33 | 2.91% |
| Cl-par. plus 18.2% $PbCrO_4$ ..... | 2.10 | 1.21 | 1.06 | 0.99 | 5.36% |
| Cl-par. plus 7% $Fe_2O_3$ ..... | 11.80 | 6.06 | 3.49 | 2.34 | 23.69% |
| Cl-par. plus 18.2% $Fe_2O_3$ ..... | 15.60 | 6.28 | 3.25 | 2.23 | 27.36% |
| Cl-par. plus 7% ZnO | Vigorous reaction—material foamed out of test tube 3 minutes after application of heat. | | | | |
| Cl-par. plus 7% $Fe_3O_4$ | Vigorous reaction—material foamed out of test tube 3 minutes after application of heat. | | | | |
| Cl-par. plus 7% $Fe_3O_4$ plus 33% $CaCO_3$ ..... | | | | | 15.59% |
| Cl-par. plus 7% $Sb_2O_3$ | Material formed SbCl which volatilized and in the presence of water formed the insoluble antimony oxychloride in the absorbers. | | | | |

It has been proposed that additional fire-retarding properties may be imparted to fabric treated in this manner by the release of carbon dioxide which may be formed as the result of the chemical reaction between hydrogen chloride, evolved from the chlorinated material, and calcium carbonate. Calcium carbonate is commonly used as a neutralizing agent for any acid evolved at ordinary temperatures.

Another reason for using chlorinated paraffin is its action as a non-volatile vehicle. In this capacity it acts to hold together the pigments, fillers and other commonly used materials. Because of its characteristics, chlorinated paraffin may be used as the medium for the dispersion of the pigment. Its plasticizing characteristics add further to the usefulness of chlorinated paraffin in applications of this type. The use of a film-forming resin is necessary to obtain water resistance and for the protection of the pigments against rubbing off. To avoid a stiffening of the fabric this resin must be plasticized. From the wide range of available resins it is not difficult to select one which when plasticized by chlorinated paraffin imparts to the fabric the required properties.

Before going further into the uses of chlorinated paraffin in this application, a few of the characteristics of this material will be presented. In its production the base paraffin most commonly used has a melting point of 124 deg. F. to 130 deg. F. During the first stages of chlorination the product resembles a low viscosity oily liquid. Upon the addition of more chlorine the product increases in viscosity until the chlorine content reaches approximately 68 per cent, at which time the product is a hard resinous material.

As previously mentioned, the chlorinated paraffin used most extensively in the treatment of fabric has a chlorine content ranging from 42 to 45 per cent. Properly manufactured chlorinated paraffin is light straw in color, is free of sediment, of free HCl and free chlorine. It neither oxidizes nor polymerizes and has a very low vapor pressure. It is soluble in most of the common solvents such as ketones, aliphatic and aromatic hydrocarbons. Its compatability with various resins is not limited to any special type; however, resins such as the vinyl, alkyd, phenolic, and urea types are most generally used for fabric application.

Recently, chlorinated paraffin containing from 60-70 per cent chlorine has become available. While the use of this material has not been widespread for fabric treatment, early work indicates that it acts efficiently in reducing burning caused by afterglow. This has been particularly noticeable in work on loosely woven material such as camouflage nets. As would be expected, material in the higher chlorine content range presents a problem of stiffening fabric with which it is treated. Many plasticizers are available for use in this connection and conveniently enough the lower chlorine content paraffins (42-45 per cent) serve well.

Manufacturers of chlorinated paraffin were faced with the problem of protecting their product against decomposition during storage and shipping. The product, usually stored and shipped in metal drums, upon reaching the consumer would quite often contain an appreciable amount of residual acid and would be considerably darker than when produced. To eliminate these undesirable conditions, most, if not all, manufacturers incorporate in their product reagents termed stabilizers. While the prime advantage of using a stabilizing agent is to provide the consumer with a better raw material, its ultimate value may be evident in reducing tendering of treated fabric.

The tendering of cotton fibers due to the relative instability of chlorinated paraffin is greatly reduced, in fact, almost eliminated by the use of protecting materials. Decomposition of chlorinated paraffin is hastened by the action of ultra-violet light, heat, and catalysts formed by reaction of HCl and pigments. Protection against ultra-violet light is obtained by the use of carefully selected pigments and fillers. As hydrogen chloride is the main decomposition product of chlorinated paraffin it is desirable to have present compounds such as calcium carbonate which will absorb any liberated HCl before it can react to form injurious catalysts, such as the chlorides of zinc and iron, which greatly increase the decomposition. The formation of these catalysts may be practically eliminated under normal conditions by the use of buffering or neutralizing agents.

The deterioration of fabric by certain species of bacteria has long been a problem of great importance. During the present time when our fighting forces are situated in areas where conditions greatly favor mildew growth we must consider not only this danger of loss from the economic point of view but also the necessity of further burdening our production and shipping facilities in order to replace fabric destroyed by these organisms.

Fortunately, there are available several suitable mildewproofing agents. Probably the better known and most widely used were the chlorinated phenols. Copper salts also have been used satisfactorily, although their use was somewhat curtailed by availability. Lately, however, the use of copper compounds has increased and a recent supplement to an army specification specifies the use of copper naphthanate. Chlorinated paraffin itself will retard mildew growth; however, it is deemed necessary to include a more potent substance in a treating formula.

Many types of resins are suitable as film formers for fabric treatment. Those most commonly used at the present time are the aforementioned alkyds, phenol-formaldehyde and urea-formaldehyde. Chlorinated rubber, vinyl chloride resins, and ethyl cellulose have been used with perhaps better results, but conditions brought about by the war either eliminated these resins entirely or so greatly reduced their availability for this type of fabric application that it was necessary to find satisfactory substitutes.

The use of a resin in fabric treating helps to provide water resistance and also prevents the "crocking" or rubbing off of the chlor-paraffin-pigment mixture by forming a dry continuous film.

The following may serve as an indication of the component parts and the ratios thereof in a treating formula:

| | *Per Cent* |
|---|---|
| Non-volatile vehicle | 29-32 |
| Pigment and fillers | 28-31 |
| Volatile vehicle | 43-37 |
| Non-volatile vehicle: | |
| Chlorinated paraffin | 22-24 |
| Resin | 7-8 |
| Pigment and fillers: | |
| Antimony oxide | 7-8 |
| Calcium carbonate | 8-8.5 |
| Iron oxide | 8-9 |
| Coloring pigments | 4-4.5 |
| Mildewproofing agent | 1-1 |
| Volatile vehicle: (Choice of) | |
| Ketones | |
| Mineral spirits | |
| Varsol | |
| Stoddard solvent | |
| Xylol | |

A formulation such as outlined is usually prepared by grinding the pigment part of the formula in chlorinated paraffin. The grinding may be done either on paint rolls or in a pebble mill, the former seemingly preferred. Not all of the chlorinated paraffin is required to wet down the pigments, the balance of which may be added before cutting the mix with solvent. It is sometimes preferred to withhold the calcium carbonate until after the grinding operation is completed as it is easily mixed into the compound by agitation.

The resin is dissolved in a portion of the solvent. Heat may be used for this operation when a solvent of reasonably high flash point is used. The resin cut is then added to the pigment-chlorinated paraffin mix and this mixture is then cut with solvent to the desired solid content.

The fabric to be treated is passed through a trough containing the impregnating solution and thence through squeeze rolls or over knife edges which remove the excess treating solution. The pickup of compound by the fabric may be controlled by adjustment of the rolls or knives. It is usually desired to obtain a pickup of approximately 50 per cent.

The drying operation consists of removing the solvent by passing the treated fabric through an oven with forced draft, by festooning or over dry cans. The heat treatment also sets up any heat-reactive resins, thereby providing the fabric with a dry finish.

Fabric treated for the armed forces must conform to exacting specifications. An accelerated weathering test designed to simulate conditions found in actual exposure to the elements is accomplished by the use of an apparatus known as an accelerated weathering unit. A typical accelerated weathering unit is the National Carbon Company's Model Xla. In this machine the samples of treated fabric are subject to ultra-violet rays and water sprays.

Before treated fabric is accepted for use by our armed forces it must pass rigid specifications both before and after the accelerated weathering test. A few of the requirements will be briefly outlined:

### 1. Treatment

The treating compound must be applied uniformly to the fabric and must thoroughly impregnate the fabric.

### 2. Fire Test

Specimens 2 by 10 inches are cut with the long dimension in the direction of the warp and in the direction of the filling. These samples are suspended ¾ inch above a Bunsen burner adjusted to give a luminous flame 1-½ inches long. The flame is applied vertically for twelve seconds, after which time the flame is withdrawn. The fabric must not burn longer than two seconds after the flame is removed. The average length of char must not be more than 3-½ inches.

### 3. Flexibility

The treated fabric must be approximately as flexible as the untreated fabric and must retain a fair degree of flexibility when subjected to a temperature of—30 deg. F.

### 4. Water Resistance

In general the treated fabric will be considered satisfactory if the water leakage is not in excess of one-fourth of the fabric from which it is made.

### 5. Resistance to Mildew

The specimens to be tested are buried in soil rich in bacteria that decomposes cellulose. The samples are covered with one-fourth inch of soil and kept at approximately 75 deg. F. with a moisture content considered best for growing plants. The loss in tensile strength after soil burial must not exceed 10 per cent of the finished fabric.

As often happens during the time of war, great advances are made by industry that show marked effects on postwar living conditions. Fire has long been one of man's worst enemies, and the development of fire-retarding treatments thus far produced during the present crisis is certain to have its beneficial results in postwar applications.

Fires which, in the past, have been started by such things as a burning cigarette carelessly dropped on an awning can be eliminated by the use of fire-retardant fabric. Tarpaulins used to cover cargoes on commercial carriers often have been ignited by sparks coming from machinery or exhaust systems. Here, too, fire-retardant fabric can be used to eliminate the fire hazard.

## REFERENCES


1. American Dyestuff Reporter, June 30, 1943; August 30, 1943.
2. Jeffersonville Quartermaster Corps. Specification 242.


## Division of Cellulose Chemistry—

*(Concluded from Page 180)*

powder. However, this material contains approximately the same methoxyl and total hydroxyl groups as the total fraction. Classification reactions show that the product is a phlobatannin.

The phlobaphene contains 6.9 per cent methoxyl, 63.0 per cent carbon, 5.8 per cent hydrogen, 9.8 per cent phenolic groups, and 12.5 per cent total hydroxyl groups. The high methoxyl content indicates that this fraction may contain some acetone-soluble lignin.

Alkali fusion of both the tannin and phlobaphene yielded only protocatechuic acid and catechol. Alkali fusion of the corresponding methylated products yielded only veratric acid. Oxidation of the methylated tannin yielded veratric acid. Destructive distillation of the phlobaphene gave catechol and small amounts of phenol.

Ultraviolet absorption spectra for both the tannin and the phlobaphene are similar to those for mimosa tannin and spruce alcohol-soluble lignin. Methylation with diazomethane does not cause any significant change in the ultraviolet absorption spectra. A close structural relationship between redwood tannin and lignin is indicated.

Under suitable pH conditions redwood tannin is a good tanning agent. It has good antioxidant properties, and it may be used in ore flotation.

10:10—3. *The Preparation and Properties of the Ethers of Hardwood Alkali Lignin.* F. E. Brauns and H. F. Lewis, The Institute of Paper Chemistry, Appleton, Wis., and E. B. Brookbank, Development Department, The Mead Corp., Chillicothe, Ohio.

Comparatively few lignin ethers are known. Those described have been prepared by methylation or ethylation with diazomethane and diazoethane or dimethyl sulfate and diethyl sulfate, respectively. Alkali hardwood lignin contains several slightly acidic hydroxyl groups which permit the formation of such metal salts of this lignin as the copper, tin, nickel, mercury, and lead. Lead salt is particularly reactive toward the alkyl halides (particularly the iodine) with the formation of the corresponding ether. This reaction has been used for the preparation of the methyl, propyl, isopropyl, butyl, amyl, heptyl, decyl, lauryl, stearyl, allyl, and benzyl ethers. The compounds are insoluble in dilute alkaline solutions; their solubility in organic solvents increases with increasing chain lengths of the alkyl groups to such an extent that the stearyl ether is soluble in benzene, ether, and petroleum ether.

10:40—4. *Carbohydrates—The Source Material of Natural, Solid, Liquid, and Gaseous Fuels.* E. Berl, Carnegie Institute of Technology, Pittsburgh, Pa.

From quick or slow-growing plant material and farm wastes, for instance, from algae, sugar cane, bagasse, molasses, cornstalks, corncobs, seaweed, Irish moss, wood, sawdust, etc., which contain carbohydrates either in insoluble form as cellulose, or in soluble form as water-soluble sugars, coals of coking or noncoking nature, or liquid, semiliquid, and gaseous fuels can be produced. The carbohydrate content of the original material can be converted at will into solid fuels with carbon contents up to 83 per cent, or into liquid fuels with carbon contents between 76 and 82 per cent, and oxygen contents from 20 to 5 per cent. Oxygen-free hydrocarbons can be produced by hydrogenation or cracking of the resulting solid or liquid oxygen (nitrogen or sulfur)—containing fuels. Gasoline, kerosene, lubrication oil, and as by-product coal, asphalt-like material, and methane and homologs result. The conversion can be carried out in such a way that 60 to 50 per cent of the carbon content in the original organic material may be converted into solid or liquid fuel. This yield is identical with the carbon yield obtained by alcohol fermentation of water-soluble fermentable sugars.

11:30—5. *Analysis of Cellulose Derivatives. V. Total Acyl in Cellulose Organic Esters by Saponification in Solution.* Carl J. Malm, Leo B. Genung, Robert F. Williams, Jr., and Mary Alice Pile, Eastman Kodak Co., Rochester, N. Y.

Most of the saponification methods for the determination of total acyl in cellulose organic acid esters involve heterogeneous conditions. A method has been developed in which the sample is saponified in solution. As a result homogeneous saponification conditions exist which eliminate errors due to the condition of the sample, improve the accuracy, shorten the time of saponification, and give a better end point. The effects of time, temperature, and alkalinity were studied and the optimum conditions for each were established. The range of applicability of this method is discussed and compared with the Eberstadt and alcoholic alkali methods.

The basic principle followed involves solution of the sample in a suitable solvent followed by stepwise additions of alkali and water under conditions such that the ester remains in solution until saponification is practically complete. When the regenerated or only slightly esterified cellulose finally precipitates, it is in a soft finely divided form which does not interfere with the completion of the reaction or the back-titration.

The precision obtainable by this method has been evaluated and limits of uncertainty (maximum range within which nearly all carefully run values should fall) are ± 0.1 to 0.2 per cent acetyl, depending on the type of ester being analyzed.

A measure of the accuracy of the method was obtained by analyzing samples for free hydroxyl and for acetyl or apparent acetyl (saponification value calculated as acetyl) and complete acyl in the case of cellulose mixed esters. The observed acetyl or apparent acetyl values were compared with those calculated by difference from observed free hydroxyl contents and molar ratios of the acyl groups in the case of cellulose mixed esters, assuming exactly three hydroxyls per glucose unit of cellulose. The agreement in all cases was well within experimental error.

# Process Equipment on Wheels for

# FLEXIBILITY*

**By the ENGINEERING STAFF**
*Althouse Chemical Co., Reading, Pa.*

**While the equipment described in this article was designed primarily for use by a dyestuff manufacturing plant, many of the items and processes mentioned will be of value to the dyer and finisher.**

A UNIQUE equipment problem confronts a dyestuff manufacturer who must frequently place new developments into plant production. This problem is to select or design equipment that will be flexible and useful in a wide range of reactions and under greatly varying conditions. It is necessary to anticipate the needs of the future, where possible, for the advancements in dyestuffs continue to come at a rapid pace. Any special equipment designed to cover only the needs of a single new product may be useless in a short time if that particular item falls victim to progress. In any plant which must regularly cope with the addition of new items, along with regular manufacture, a little forethought and a little extra initial equipment expenditure can pay high dividends.

A pressure vessel designed for higher pressure than needed at the moment may cover the pressure requirements of some future operation. A pump capable of withstanding the corrosion conditions for one specific operation may be quickly ruined in more severe service. The same is true of valves and pipe. Smaller pieces of equipment gain considerable usefulness with easy portability.

It is obvious that all these things can be overdone and many factors must guide the engineer to a practical selection. For instance, in steel pressure vessels, it is hard to justify a margin of pressure or temperature that will cross into another A.S.M.E. code classification. Pressure margins must be balanced against decreased rates of heat transfer. A reaction vessel or autoclave for an operation that requires only heating has many potentialities if thought is given to possible use in exothermic reactions where cooling may be an important factor. It is not always necessary to incorporate extra features if the design anticipates their addition at a future time.

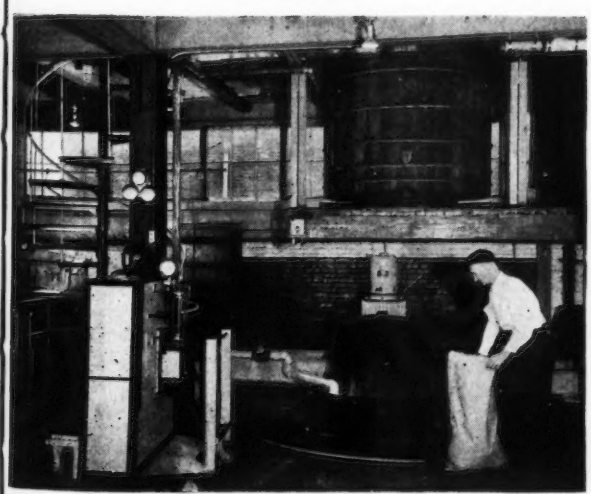
The corrosion problem in dyestuff manufacture is complex. The intermediates for water soluble dyes are for the most part processed in aqueous mediums. Extremes of alkalinity and acidity are encountered along with high and low temperatures and occasionally oxidizing conditions. Acid solutions of intermediates such as para nitrochlorobenzene sulphonic acid which have a labile chlorine atom are among the most active metal corroding agents known.

Consideration must be given to the effect of attacked metals on organic products. Whenever a product attacks metal it is necessary to realize that perhaps there has been mutual damage and the corroding chemical has also been adversely affected. The actual dollar damage to organic products is usually far greater than to equipment. This is not apparent until more resistant equipment is installed. Since many organic intermediates are rather expensive, unexpected dividends can come from this quarter.

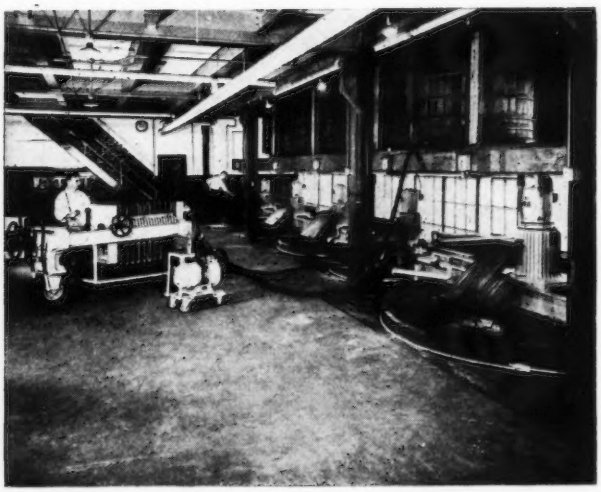
Iron and steel are not only easily corroded in aqueous solutions but the resulting iron in solution is often detrimental to intermediate stages of manufacture and occasionally to final product. Copper and consequently brass and bronze are particularly harmful to certain dyes. Lead, though considerably attacked, is generally harmless to finished dyes though some diazos are affected by it. Monel is satisfactory if the solutions do not attack it. If they do, the resulting copper ions are injurious. We have tested some 40 alloys for our own all-purpose corrosion resistance. In our particular case Hastelloy C has

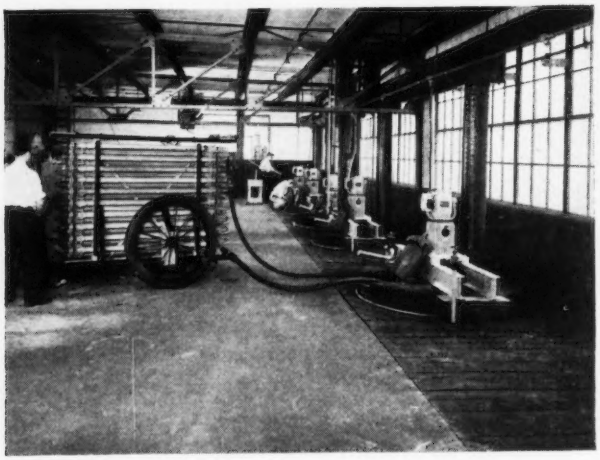
* Reprinted from *Chemical & Metallurgical Engineering*, January, 1944.

**Portable gaseous phosgene and chlorine equipment. Steam jet is shown hanging on edge of vat and special valve is in use on mezzanine tub.**

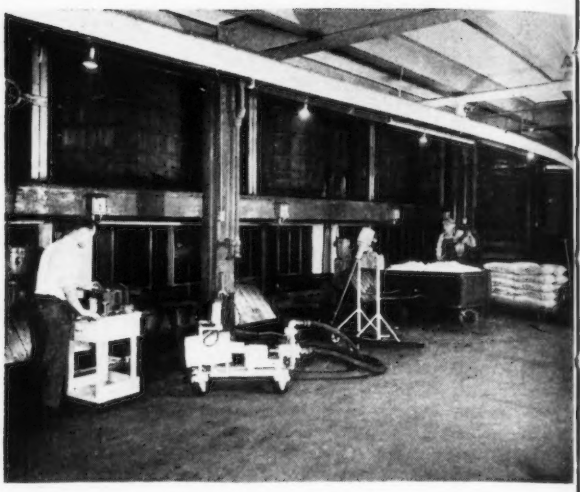


**Portable closed delivery filter press connected for clarification of dissolved intermediates or diazo solutions prior to coupling.**





**Pyrex heat exchanger with end guards removed is portable. Black wooden pipes near right wall are fume exhaust system.**



**Table, corrosion-resistant pump, mixer, ice truck, and storage skids are all portable for ease in handling.**

proved best though it is somewhat limited in available forms and is difficult to machine. Rubber, glass, stoneware, and porcelain are without effect on the most sensitive materials within their practical limitations of temperature, alkalinity and solvent action. Wood in strongly alkaline solutions may have a mild reducing effect though not often serious. In general it is a remarkably resistant material.

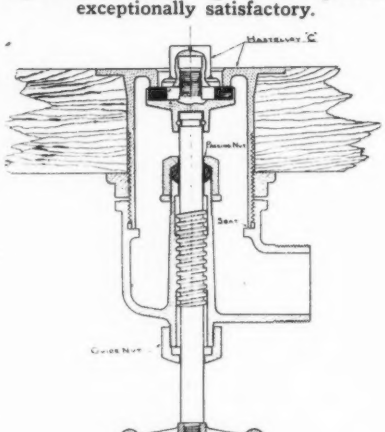
The above limitations of suitable materials leave little choice in equipment that may have to stand severely corrosive solutions. Below is outlined the equipment we have found most suitable in resisting attack in the many operations performed in aqueous mediums.

Vats for dissolving, diazotizing, coupling and for drowning out sulphonations are Louisiana cypress with four baffle staves each. All vats are covered. Agitators, all of the turbine type, are rubber covered except for a few lead covered and all-wooden ones necessary for solvent emulsions. Because of a specially built extended bearing on the bottom of the unit drives, no step bearing is used on turbine shafts under 8 ft. long. Transite and wooden pipes convey fumes to water jet condensors. The outlet valve is a special one described below, the exposed portions of which are Hastelloy C. For heating, live steam is introduced through a portable steam jet made of the same metal. Since the special valve is of the flush bottom type and the steam jet is removable there is no place protected from agitation which can shelter even the smallest volume of product and keep it from the reaction. This feature is likewise helpful in cleaning vats to prevent contamination of subsequent batches.

The rubber covering on the agitator is formed by spraying on many layers of a specially compounded latex which vulcanizes at low temperature. This is applied over a bonding material which has not given a single failure in over two years of service though used frequently at boiling and near boiling temperatures. Cooling with crushed ice gave some trouble with abrasion of the rubber covering at the outer end of the leading edge of the turbine blade. This was effectively countered by using a short rubber sleeve of one-quarter inch thickness in the abraided area.

The steam jet is far more satisfactory than an open steam pipe. Higher temperatures can be reached, for the mixing action of the jet prevents local boiling. Near the boil, an open steam pipe hammers to a degree harmful to a wooden tub. This vibration is entirely eliminated when a jet is used. Hastelloy C jets and pipe have shown no signs of corrosion. The portable jets are made to hang over the edge of a tub and connect to a steam line with a steam hose. The length of the pipe is such that the jet is at least 12 in. from the floor and since the jet is pointed in the general direction of the center no erosion of the wood occurs. This necessitates at least one jet for a vat of each different height.

**This chemical flush bottom valve designed by Althouse engineers has proven exceptionally satisfactory.**



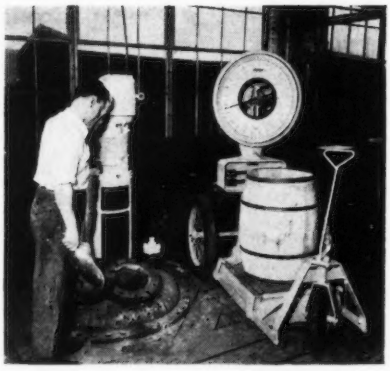

The need for a flush bottom valve for a wooden vat was so great that one was designed and built which well serves the requirements and has proven exceptionally satisfactory. It is shown in an accompanying sketch. All portions exposed to the inside of the tub, that is, the inside flange with machined seat and a cap nut to hold the washer on the disk are made of Hastelloy C. The bonnet and stem which are exposed only during those times when the tub is being emptied are very satisfactory if made of Monel for the exposures are relatively short. The outlet is threaded for connection with a 1½ in. hose coupling. An unusual departure from regular valves is the packing nut on the inside. The lower nut is merely a bearing and is actually drilled to drain any liquid that might have seeped past the packing nut. It is believed that this valve could be advantageously used by anyone who is handling corrosive materials in wooden tubs or is troubled by the small stagnant space resulting from regular valve assemblies.

Transport of liquids throughout the plant is done in natural or synthetic rubber hoses of 1½ and 2 in. sizes. The variations of alkali and acids are most economically compromised in a good grade of wire wrapped hot water hose. The portion of the hose coupling to which the hose is clamped is made of Hastelloy C, the coupling nut which does not contact the liquid is brass. With Hastelloy C nipples machined square at both ends and with straight treads, hoses can be connected to one another by hand.

Pumps are all portable, with direct-drive motor and starter ready to plug in at any three-phase outlet. These are either Hastelloy C or hard rubber lined. Wooden filter presses of the plate and frame type are fitted with alloy feed pipes and valves. These presses are served by lead lined pressure tanks where compressed air furnishes the filtering force. Products which would settle in these blowcases filter rapidly and hence are pumped directly to the presses. Filter presses are dumped into wooden trucks built with the inside ply consisting of asphalt impregnated oak. They are more satisfactory in withstanding corrosion than alloy lined trucks which have been tried.

Portability has been made a factor in every piece of equipment that might handily be used on different floor levels and can be dimensionally accommodated by the elevators. One of the largest pieces that has been put on wheels is a 30 in. closed delivery filter press. This is most useful in clarifying diazo solutions just prior to coupling and for charcoal clarifications whenever and wherever needed. The press is merely placed in the hose line from the pump at a place where the filtrate runs by gravity into the vat or tub desired. The convenience of such an arrangement is evident from the accompanying picture.

When dilution by live steam or ice cannot be tolerated in heating and cooling operations heat exchange is necessary. Metal coils in a tub greatly limit its usage due to corrosion possibilities. The solution is a portable Pyrex glass heat exchanger through which is pumped the material to be heated or cooled. Any tub then has the equivalent of a coil. In order to obtain the desired capacity within the dimensions permitted by the elevators a staggered cascade was made which will entirely drain by gravity. Counter-current circulations are used and the jacket is split near the middle in order that brine cooling, if desired, may follow regular water cooling in the first part of the exchanger. This equipment can be rolled up to a still and with a few extra Pyrex fittings serve admirably as a reflux or take-off condensor. It is truly quite versatile when it is on wheels.



**Portable scales are not new but with wheels like this they are far more useful than normal in this dyestuffs manufacturing plant of Althouse Chemical Co.**

It has been found to be expedient to make portable the equipment for dispensing gaseous chlorine and phosgene. This unit accommodates two cylinders so the emptying of one does not interrupt operations. With a low platform, one man can easily change cylinders. Heating is accomplished by three flat electric strip heaters which are clamped to the cylinder.

The most efficient heating results from keeping this heating unit just below the liquid level in the cylinder. This supplies heat to the area where heat of vaporization is needed. The gas is metered through a rotameter with a Hastelloy C float. Saran tubing with bronze flange fittings works satisfactorily.

Crushed ice for azo couplings and diazotizations is handled in wooden trucks each holding about 1,000 lb. The bottom of these trucks clears the top of all wooden vats. The truck is pushed to a vat, the end gate raised and the entire 1,000 lb. of ice can be pushed through the gate in 30 sec. They are constructed of two-ply wood, the inner ply being asphalt impregnated oak. This construction has shown excellent resistance to shovel wear and is quite impervious to moisture.

A portable mixer is fastened to a small truck in such a manner that it remains attached while dissolving drums of sodium nitrite or alkalis that may be needed. Workmen have dubbed it "The Mix-master."

Bulk items of soda ash, bicarbonate, and salt are stored on skids. A minimum of effort is entailed in transporting these where desired. It is a matter of seconds only to pick up a ton load of one of these materials with a skid truck. A dial scale has been put on large wheels. Small tables on large casters serve throughout the plant as portable stands for pH meters and a convenient place to keep thermometers, test papers, hydrometers, and the like. Since belts which develop static electric charges are not used, a pH meter can be used anywhere a plant control chemist wishes.

A major part of this program relies on pneumatic tires. As an ironic and humorous consequence of all this portability, easy maintenance of properly inflated tires required us to make a small portable air compressor.

# TRADE NOTES • NEW PRODUCTS

## • WINTER MEETING, OPTICAL SOCIETY

The first afternoon session of the Winter Meeting of the Optical Society of America held at Hotel Pennsylvania recently was devoted to a Symposium on the Ostwald Color System. This is the system of color organization originally developed by Dr. Wilhelm Ostwald, German scientist. The presiding officer was Dr. Deane B. Judd. There were four invited papers.

Herman Zeishold of van Ameringen-Haebler, Inc., discussed "The Philosophy of the Ostwald Color System." Mr. Zeishold, chemist and former student of Dr. Ostwald, recalled that Wilhelm Ostwald enjoyed a universal reputation as a co-founder of physical chemistry; but pointed out that his later work in natural philosophy and his research in color, its immediate offspring, are less widely known in this country. Mr. Zeishold emphasized Dr. Ostwald's interest in the psychological properties of visual sensation and their measurement.

Carl E. Foss, color consultant, who did the developmental and production work on the Color Harmony Manual and Index, presented an "Analysis of the Ostwald Color System." He showed how the ideal Ostwald color system could be developed from the color equation and semi-chrome theory described by Ostwald. These data were determined for the standard observer and daylight illuminant of international agreement.

The results of measurements of samples in previous Ostwald albums were presented and compared with equivalent points in the ideal Ostwald system. Despite the limitations imposed by available colorants upon the preparation of a collection of color samples, an arrangement which preserves the principle Ostwald concepts: (1) the monochromatic triangle (constant dominant wave length), (2) the complementarism of opposite triangles, and (3) constant purity of the shadow series was outlined.

Walter C. Granville, color technologist at the Interchemical Corporation Research Laboratories, presented a paper on "Colorimetric Specification of the Color Harmony Manual from Spectrophotometric Measurements." He pointed out that in both the United States and Canada an increasing number of people are becoming interested and are using the Ostwald system of color notation for developing color harmonies, and for purposes of color specification. Thus, it is desirable that basic colorimetric specifications be determined for the most

recent and comprehensive production of color chips based on the Ostwald system. Such chips are embodied in the handbooks of the Color Harmony Manual published by the Color Laboratories Division of Container Corporation of America.

Colorimetric specifications have been computed for the ICI standard observer and illuminant C, from spectral reflectance curves on the 680 chips in the Color Harmony Manual. A portion of these colorimetric data was compared with similar data on earlier productions of color samples based on the Ostwald system.

These colorimetric data specifically add to the value of the color chips as standards. In addition, they permit conversion from this recent production of color samples to others similarly standardized.

Faber Birren, author and color consultant, talked on the "Application of the Ostwald System to Design of Consumer Goods." He told how, after having studied many of the major color systems as a student, he learned that in the every-day world of designing consumer goods these theories were not practical because they were not universally valid. Then, years later, he found that the Ostwald system of color harmony provided the broad foundation necessary for any work in color. In his talk Mr. Birren stressed the importance of correct and workable *general* principles, as opposed to minor rules and limitations, and it is here that he feels the Ostwald system to be a source of practical inspiration.

The application of the Ostwald organization of the colors to industry was illustrated by several charts. Among these was the striking arrangement of fabrics designed by Pola Stout and produced by Botany Worsted Mills. These fabrics were developed not only to provide extensive and well balanced wardrobes, but also with a view to assuring harmonious color combinations.

Another series of charts was devoted to the use of the Ostwald standards in the preparation of color pages for Sears Roebuck under the direction of Mary Lewis and Mrs. Helen Taylor. In these charts it was shown that the standards were used in selecting color for merchandise, in controlling color photography and engraving, and in communication between departments generally.

Other displays showed reference to the Oswald colors by Higgins Ink Company, Fiatelle, Inc., Faber Birren Company and Container Corporation of America.

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### ● CELANESE PATENT

Celanese Corporation of America this week was granted United States Letters Patent No. 2,346,240 which relates to a device making it possible for the automatic detection of broken threads or similar defects in fabric being knitted on warp-knitting machines, it is stated.

According to the invention there is provided a photo-electric cell positioned on one side and substantially the full width of a fabric, and a light source co-extensive with the photo-electric cell is positioned on the opposite side of the fabric, so as to direct light on said fabric.

There is also provided operative means controlled by the photo-electric cell and adapted to stop the machine or give a warning signal on undue variation in the amount of light entering the cell by reason of faulty fabric.

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### ● ELECTED DIRECTORS

Henry H. Bitler and Dr. Frank H. Reichel have been elected directors of the American Viscose Corporation.

Mr. Bitler is manager of acetate rayon and Vinyon production for American Viscose Corporation, and has been identified with the corporation since 1920. From 1930 to 1940 he was manager of the corporation's plant at Meadville, Pa., at which acetate rayon and Vinyon are produced.

Dr. Reichel has been associated with Sylvania Industrial Corporation of Fredericksburg, Va., since its organization in 1929 and has been its president since 1938. Sylvania Industrial Corporation manufactures cellophane and allied products.

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### ● $50,000,000 IN WAR BONDS

The Chemical Industry made an enviable record in the purchase of War Bonds in the Fourth War Loan drive just ended. Incomplete returns from the heads of the War Bond committees in this field reveal that over $50,000,000 worth of war savings bonds were sold to the employees in the field of Chemical Industries. In the campaign, the industry had, as its chairman, Charles S. Munson, President of the Air Reduction Co., Inc. W. C. Keeley, Vice President of the Air Reduction Co., Inc., was Co-Chairman of the Chemical Division. Edward H. Anchors was Liaison Officer for this Division of the War Finance Committee.

The Chemical Division was one of thirteen organized under Commerce & Industry of which William E. Cotter, Counsel for the Union Carbide & Carbon Corporation, was director. Mr. Cotter continues in this position.

The active heads of these bond selling committees who were associated with Mr. Munson in contacting the various Chemical concerns of Manhattan and who were responsible for such a splendid contribution to Manhattan's quota in the "Fourth" drive were: H. M. Albright, U. S. Potash Co.; I. Alenbik, Albi Chemical Corp.; Geo. A. Bennington, Mutual Chemical Co. of America; Howard Berry, Mathieson Alkali Co.; John J. Butler, West Virginia Pulp & Paper Co.; Reid L. Carr, Columbian Carbon Co.; Robert H. DeGreeff, R. W. Gre & Co.; Henry W. Denny, Commercial S vents Corp.; Ralph E. Dorland, The D Chemical Co.; O. N. Frankfurter, Lati American Export Sales, Heyden Chemi Co.; Gilbert E. Grogan, American Cyan mid Co.; George F. Handel, Cincinn Chemical Works, Inc.; E. O. Heyl, A Chemical Corp.; Albert M. Kahn, C solidated Products Co.; Louis Lara, J. Huber, Inc.; P. F. Lavedan, Liquid C bonic Co.; A. T. Loeffler, Monsanto Che ical Co.; L. F. Loutrel, Shawinigen Pro ucts Corp.; C. A. Mace, Synthe Organic Chemical Mfgrs. Assn.; Milton Martin, U. S. Industrial Chemical; Ch F. McKenna, General Aniline & Film Corp W. J. Reich, Carbide & Carbon Chemi Corp.; Chas. M. Richter, Pharma Chemi Corp.; C. M. Schultz, American Agricu tural Chemical Co.; W. C. Shallcross, So vay Sales Corp.; Willard D. Smith, Fre erick H. Levey Co.; M. A. Solmssen, Per lin Co. of New York; Irving H. Taylo Merchants Chemical Corp.; B. J. Tyle Albi Chemical Corp.; A. Lucian Walk Jr.; Texas Gulf Sulphur Co.; Stephen White, Niagara Alkali Co.; M. Lan bourne Williams, Jr., Freeport Sulphur C and Albert Woods, Chilean Nitrate Sal Corp.

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### ● NEW HERCULES PRODUCT

Hercules Powder Company, Cellulos Products Department, Wilmington, De has introduced sodium carboxy-methy cellulose, a cellulose derivative which soluble in water. Experimental researc is being conducted to determine the suitability of the material in the manufactur of emulsions, paints, textiles, oil and othe industries.

Now in small-scale production, the chemical is available in experimental quantities only. Properties of sodium carboxy-methyl-cellulose make it a stabilizer and emulsifying agent.

"The material should be useful where hydrophilic colloids possessing marked suspending, thickening, stabilizing and film-forming properties are required," the company says. "Some of its possible applications are to thicken textile printing pastes, to emulsify emulsion paints and lacquers and to provide a protective colloid for oil-in-water-emulsions.

"Its film-forming properties make it useful in coatings, particularly for greaseproof coatings. Other uses for the water soluble colloid are in the manufacture of boiler compounds, creaming latex, oil drilling muds, ceramics, can sealing compounds, anti-stick compounds, leather finishes and many other industries.

"Sodium carboxy-methyl-cellulose is supplied as a white, granular powder, odorless, tasteless and readily soluble or dispersible in water. Very viscous, stable aqueous solu-

tions can be obtained with it. Aqueous solutions can be evaporated leaving colorless, tough, transparent films which are unaffected by the common organic solvents, oils, fats and greases. Some salts and acids react with sodium carboxy-methyl-cellulose producing films insoluble in water."

Tables and data have been prepared by the company showing viscosity, effects of salts and acids, compatibility with various materials and physical, chemical and other properties.

Unlike nitrocellulose, cellulose acetate, ethyl cellulose and most other cellulose derivatives used as industrial materials, it is soluble in water. It is this property upon which its principal value in industry is based.

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### • CIBA REVIEW

The Ciba Review of October 1943 features Cloth Merchants of the Renaissance as Patrons of Art, the contents of which are described by the following titles:

The Cloth Trade as a Source of Wealth.

The Usurers of Arras.

Florentine Merchants and the Rise of Italian Painting.

The degli Alberti, a Family of Cloth Merchants.

Piero di Cosimo de' Medici and his Agents at Bruges.

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### • INDUCTED IN ARMY

Humbert Raymond Celentano, textile colorist employed by General Dyestuff Corporation since 1934, was inducted into the United States Army at Fort Dix, N. J., on March 30, 1944.

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### • NEW NYLON PONCHO

The War Department announces that a new lightweight multiple-purpose poncho, made of coated nylon fabric, has been developed by the Office of The Quartermaster General and is soon to be issued to troops in tropical combat areas. Weighing only 30 ounces, as compared with the 55 ounce poncho made of cotton fabric, the new waterproof poncho may eventually do away with issue of shelter halves in tropical combat areas, according to reports by observers.

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### • SUMMER TEXTILE-TESTING COURSE

The accelerated course in textile and testing techniques held yearly in the main laboratories of the UnitedStatesTesting Company, Inc., Hoboken, N. J., will be repeated this summer. Students will have the instruction of the U. S. Testing Company's staff technicians working under the direction of Mr. G. R. Turner, Supervisor of the Company's Textile Laboratory and Instructor of a Course in textiles at Columbia University. Applications may be obtained from United States Testing Company, Main Laboratory, Hoboken, N. J.

### • DU PONT DYE WORKS NAMED AFTER DR. CHAMBERS

The Dye Works of E. I. du Pont de Nemours & Company at Deepwater Point, N. J., one of the largest operated by the company, has been named the "Chambers Works" in honor of Dr. Arthur D. Chambers upon his retirement after 47 years service, E. G. Robinson, General Manager of the Organic Chemicals Department, announced recently.

**Dr. Arthur D. Chambers**

Dr. Chambers has been a leader among American industrial organic chemists and was one of the group who pioneered in creating an American synthetic organic chemicals industry and in freeing this country from dependence upon Europe for dyestuffs after the last war.

His recommendations led to the establishment 26 years ago of the plant now named for him. He became production manager of the Organic Chemicals Department upon its formation and held the post until a year ago when he became production advisor.

The operations in the company's plants for the manufacture of dyestuffs and intermediates, Neoprene, tetraethyl lead for the Ethyl Corporation to be used in high octane gasoline, and many other synthetic organic chemicals were under his direction.

Born May 4, 1870, at Woodstock, Ontario, Canada, he attended local schools and entered Woodstock College in 1884, being graduated in 1888. He attended Toronto University from 1888 until 1892 when he received the degree of Bachelor of Arts. He received his Ph.D. in chemistry from Johns Hopkins University in 1896 after four years of study.

His first employment was with the Standard Oil Company at Lima, Ohio, where he spent nine months, leaving to join the Du Pont Company as assistant superintendent of the Ashburn, Mo., dynamite plant on February 1, 1897. He became superintendent in 1905 and two years later was transferred to the Louviers, Colorado, plant when it was opened in 1907.

After remaining there until 1915, he was transferred to the Development Department in Wilmington. In 1917 he joined the Miscellaneous Manufacturing Department of which Lammot du Pont then was manager. The Dyestuffs Department and later the Organic Chemicals Department were formed as the operations in this industry increased.

Dr. Chambers had originally recommended that the company should engage in the manufacture of certain dyestuff intermediates. Plants for the manufacture of the intermediates were built and the new department launched. This step led to the greater developments which followed.

Dr. Chambers, who was presented with a watch by the Wilmington staff of the Organic Chemicals Department at a dinner honoring him upon his retirement, is a member of the American Chemical Society, the American Institute of Chemical Engineers, and the Franklin Institute. He is married and two of his sons, Ivan F. and Ira D. Chambers, are connected with the Du Pont Company. A third son, Arthur E. Chambers, manages a fluorspar mine in Idaho.

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### • TEXTILE RESEARCH PROGRAM OUTLINED

An outline of the expanded program of the Textile Research Institute, Inc., has just been published by that organization in booklet form under the title "A New Opportunity for All Textile Men Through Research."

After stating the need which faces the textile industry, the booklet states that the choice between the alternatives of failure and survival lies through research. It highlights particularly the public interest phase of industrial research.

An important section of the booklet dispels the confusion that has arisen in the minds of textile manufacturers due to the emergence of several new textile research groups. It arranges these by patterns, explains their primary functions, and orients them in relation to each other and to the field of textile research as a whole. "The impression has been created that a lot of new organizations have sprung up overnight to bid for the textile manufacturer's dollar, for identical purposes," it is stated. "Actually, the amount of basic duplication in the field is amazingly small." This section concludes with an outline of the functions of the Textile Foundation, with which the Textile Research Institute, Inc. has a close working arrangement.

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### • HIGH-SPEED CLOTH HANDLING

The behavior of fast running cords with particular reference to the behavior of ropes of cloth encountered in a textile finishing plant is analyzed in the April issue of Textile Research, official publication of the Textile Foundation and of Textile Research Institute, Inc., 10 E. 40th St., New York 16, N. Y.

## • BOOK REVIEW •

***Natural and Synthetic Fibers.*** *A Looseleaf Literature and Patent Digest Edited by Dr Milton Harris, Director of Research of the United States Textile Foundation and the Textile Research Institute, Washington, D. C., and Dr. Herman Mark, Polytechnic Institute of Brooklyn, New York. First year—1944, 12 issues. First issue—64 pages with illus. Subscription price per year—$60.00. Binder—$3.00. Interscience Publishers, Inc., 215 Fourth Avenue, New York 3, N. Y.*

After careful planning and preparation, the first issue of a Literature and Patent Service devoted to the complete field of the Chemical and Physical Structure of Fibers, the intrinsic properties of Fibers and Fabrics and the processing of Fabrics, based on these intrinsic properties, has appeared.

The first issue (64 pages) contains the complete Table of Contents of this service and a number of abstracts from American, British and German periodicals and patents.

Two main features distinguish this service from similar publications. The first is the fact that the abstracts are so comprehensive that they contain most of the data and facts of the original paper and even reproduce important graphs, curves or equipment. This will very often make it unnecessary to consult the original literature for reference. In the case of the patents, the main claim is given literally.

The material within the abstract is well organized along the same simple basic pattern, in such a way that reference back to items of particular interest is facilitated.

The reference character of the service is further stressed by a second feature, namely its looseleaf form and its filing system. The whole field covered by the service is broken down in a systematic way. Each abstract is provided with a file number. By placing the abstracts in the binder according to this file number the subscriber will build up an always up-to-date reference book in which he will be able to easily locate all of the desired information with the help of the key to the file numbers.

A glance through this key to the file numbers (Table of Contents) shows that this reference book will be organized in the following way. The main division groups the various fibers according to their chemical composition. We find, therefore, a chapter on Cellulose (subdivided into Natural Cellulose, Acetate, Nitro, Viscose)—Inorganic fibers—Polyamide fibers—Protein fibers—Vinyl fibers—etc.

Each of these chapters is further subdivided and classified according to the following scheme: Manufacturing processes — Structure — Properties — Reactions — Analytical Methods and Testing. Each of these groups is systematically broken down and follows, for instance, in the case of Manufacturing processes, like a flow sheet, step by step the different stages of the spinning process from the raw material and its purification to the finished and improved product.

A glance through the abstracts of the first issue make the scope of the service clear. You will find there, for instance, patents and articles from American, British and German sources on the improving of light fastness, model experiments with thread-like molecules, molecular weight determination of cellulose with the ultra-centrifuge (by Svedberg), behavior of swollen cotton linters in solvents, action of acids on cotton, preparation and structure of polyamides, properties and behavior of nylon yarn, improving the resistance and spinning processes of protein threads.

The Publishers estimate that they will supply approximately 1000 pages in the first 12 issues, covering the subscription for the year 1944. About 50 journals will be surveyed.

## • Classified Advertisements •

**The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $6.25 per column inch or less per insertion.**

DYER WANTED: Experienced rayon acetate dyer for progressive metropolitan high standing plant. Permanent post-war position assured. State in detail school and plant experience, salary desired, age and man power situation. Box No. 515.

WANTED: Chemist-colorist by Dyestuff Manufacturer for standardization and application laboratory. Location—Massachusetts. Textile graduate preferred. State experience if any. Box No. 536.

POSITION WANTED: Experienced manager in the dyeing, printing and finishing industry desires to contact responsible organization with vision and foresight in the development and production of special finishes for the post-war trade. Will consider representing and demonstrating for a reliable chemical house. South territory preferred. Box 537.

WANTED: Dyer—Second Man—Drapery Fabrics—Opportunity for right man. Post War opportunity. Box No. 540.

WANTED: Dyer and Chemist. Narrow fabric mill located in the South. Requires the services of a man who can supervise the dyeing of narrow fabrics, both cotton and rayon, for package and skein, on vat and direct colors. Good opportunity for a man who is looking for a permanent position. Please write, giving full particulars. Box No. 541.

***(Additional Classifieds on page XXVI)***

**NOTE**

**Essential employees need release statement. Employees who are to be hired for critical occupations need release statement and U. S. E. S. consent.**

# Color Formula for '44

IN THIS CRUCIAL YEAR of war . . . the textile industry faces three major problems. 1. To complete requirements for the armed services. 2. To supply a still larger quantity of goods for civilian needs this year . . . while *maintaining* quality. 3. To plan for the postwar future.

The program here at Calco is closely integrated to achieve all three objectives in serving our customers. Daily production of dyes hews to an undeviating policy: The best dyes that money can buy. And this policy is realistic—not lip-service. Calco dyes remain the industry standard—for "money-value."

In addition, the Calco research and application laboratories have a full schedule. They are answering the day in and day out questions on dye applications for optimum results . . . with the speed that current production schedules require. Simultaneously, the laboratories are engaged in a comprehensive study of improvements in dyes for the postwar market.

Your Calco representative will bring each new development to your attention personally . . . as soon as it is made available.

NEW YORK • CHICAGO • BOSTON
PHILADELPHIA • PROVIDENCE • CHARLOTTE

Manufacturers of Dyestuffs and Chemical Specialties

We offer to the Textile and Allied Trades
a full line of

**DYESTUFFS DYEWOODS**
**CHEMICAL SPECIALTIES**

The experience gained through many years of manufacturing quality products, progressive research policies and the faith of our customers allow us to face the present emergencies with confidence.

As in the past, we are prepared to help you with any manufacturing problems you may have. We place our experience and our research facilities at your disposal.

*MAY WE SERVE YOU?*

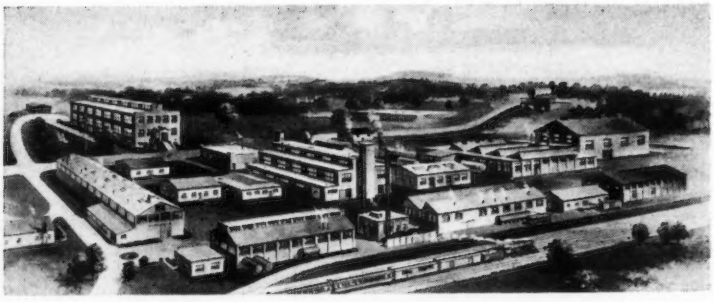
COMMONWEALTH COLOR & CHEMICAL CO.

MAIN OFFICE AND WORKS: Nevins, Butler and Baltic Streets, Brooklyn, N. Y.

Philadelphia • Chicago • Charlotte • Gloversville • Kansas City • Montreal

NYANZA

ANILINE & ALIZARINE COLORS
TEXTILE CHEMICALS



FACTORY AT ASHLAND, MASSACHUSETTS

**NYANZA COLOR & CHEMICAL COMPANY, Inc.**
215 WATER STREET NEW YORK CITY

FACTORIES:
CHEMICAL MANUFACTURING CO., ASHLAND, MASS. • NEW BRUNSWICK CHEMICAL CO., NEWARK, N. J.

BRANCHES:
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## HIGHLY CONCENTRATED S/V FABRISEC AA

# Provides Maximum Water Resistance with Minimum Amounts!

YOU SAVE MONEY when you make material water resistant with S/V Fabrisec AA, because it is highly concentrated.

You need less of it to do the job.

Moreover, this superior product can be easily applied in both hot and cold-water solutions with conventional equipment.

Look at the list of typical applications (below) and consult your Socony-Vacuum representative for additional information.

### GET THE FACTS ABOUT ALL OF THESE PROCESS PRODUCTS FOR TEXTILE MILLS

**S/V FABRISEC MP:** Highly concentrated. Particularly adaptable for water-repellent finishing using the two-bath process with conventional salts.

**GARGOYLE WOOLREX OILS:** Excellent qualities for carding, spinning and scouring.

**S/V WORSTEX OIL 70:** Self-emulsifying, highly resistant to oxidation and easily scoured. Recommended for French-type weaving yarns.

**S/V TEXTILE FINISHING OIL:** Wide variety of applications, including warp sizing, plain softening, starching and pre-treatment of cotton cloth before Sanforizing or Pre-shrinking. This finishing oil has excellent wetting and rewetting properties.

**S/V RAYON SOAKING OILS:** Used with gelatin and glue for soaking viscose and other artificial yarns.

### TYPICAL MILITARY AND CIVILIAN APPLICATIONS!

S/V Fabrisec AA is being used on scores of important items, both military and civilian. Here are a few typical applications:

**MILITARY:** Cotton Duck (JQD-226A-231); Barrack bags (PQD-142); Jungle Hammocks (PQD-256B); Marquisette insect netting (PQD-260A); Lace insect netting (PQD-280); Cotton braid, webbing and tapes (JQD-462).

**CIVILIAN:** Raincoats, awnings, hunting coats, sports jackets, wind breakers, etc.

Process Products
SOCONY-VACUUM

## SOCONY-VACUUM OIL CO., INC.

Standard Oil of New York Division
White Star Division • White Eagle Division
Chicago Division • Lubrite Division
Wadhams Division • Magnolia Petroleum Co.
General Petroleum Corporation of California

**These products available subject to national wartime requirements**

—BEHIND THE MAN behind the supply trains and the supply dumps—the Quartermaster who keeps our fighting army in clothes and supplies. Laurel Oils and Finishes are helping manufacturers speed deliveries of the miles of knit and woven fabrics, the mountains of hose, and the myriad items that "combat maintenance" covers.

For over 30 years Laurel technicians have worked out textile processing answers. They will be glad to cooperate with you on your war service as well as your civilian orders.

★

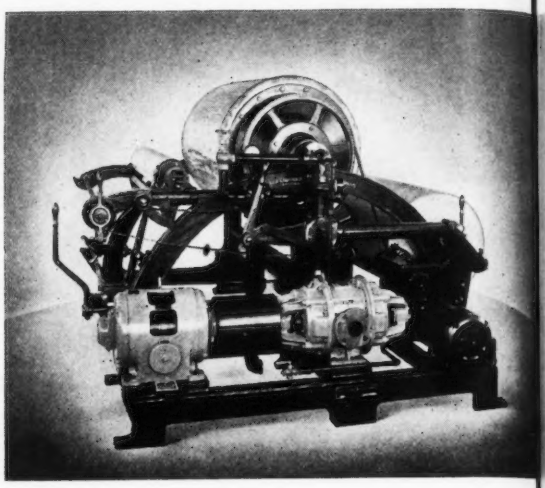
*Throw your scrap into the fight*

SOAPS • OILS • FINISHES

Laurel

**SOAP MANUFACTURING CO. INC.**

WM. H. BERTOLET'S SONS ESTABLISHED 1909
TIOGA, THOMPSON & ALMOND STS., PHILADELPHIA, PA.
WAREHOUSES: PATERSON, N. J., CHATTANOOGA, TENN., CHARLOTTE, N. C.



*Include in your post-war planning:*

## A Van Vlaanderen Decater

Improved to:

Permit faster take-out.

Provide adjustable control to regulate density of batch roll.

To give faster, smoother pick-up and quicker clutch action.

Faster removal of condensation.

Faster-cooling and steaming.

No condensate surface obstructions.

Extra large work Cylinder.

Larger Blanket drying Cylinder (Using Vacuum, not heat), permits longer Blanket life; keeps Blanket uniformly conditioned.

There is less Blanket flexing.

*Blankets — Improved — Ask for Circular*

# VAN VLAANDEREN MACHINE COMPANY

*World's largest manufacturer of synthetic fabric processing machinery*

370 STRAIGHT ST. PATERSON, N. J.

# POST-WAR "Post-Mortem" No 5

THE SAD CASE OF THE MAN WHO THOUGHT HE COULD MEET POST-WAR COMPETITION WITH PRE-WAR MACHINERY

## A 3-POINT *"Peace Program"* for Textile Manufacturers...

1 **Make your post-war plans NOW**
don't let peace catch you without definite plans for products, markets, sales and production.

2 **Decide on new equipment needs NOW**
don't wait until the war is over before making a thorough survey of your production equipment and deciding what machines must be replaced.

3 **Order your new equipment NOW**
don't risk serious delay in securing necessary new equipment for post-war production. Metals and other basic materials will continue to be scarce for a long time after the war ends.

**If you are going to need new dyeing and finishing equipment after the war, we earnestly recommend that you place your order with us *now*. Our "Post-War Purchase Plan" assures you prompt delivery when war restrictions are lifted. Write *now* for complete details of this plan.**

ARMY E NAVY

Since America entered the war, textile machinery has been driven harder and worn out faster than ever before . . . yet scarcely a single new machine has been built. As a result, a large percentage of all machines in the textile industry should be replaced. In spite of this fact, there will be some textile manufacturers who fail to do anything about replacing worn or obsolete machines until after the war is over.

These men either believe they will be able to get replacements promptly as soon as the war ends . . . or they believe they will be able to get along with their old equipment for a considerable time after the war.

Both of these beliefs hold hope for nothing but grief. Delay in placing orders for new equipment will result in long waits for delivery after the war. And the manufacturers who are forced to operate with pre-war equipment will find themselves unable to compete successfully with those who have obtained new equipment.

What's the answer? Take action *NOW!* Determine what machines in your plant should be replaced . . . *then order those machines right away.* Our "Post-War Purchase Plan" is designed to help those forward-looking manufacturers who want new dyeing and finishing machines just as soon as possible. Write for complete details.

**SMITH, DRUM & COMPANY**
**Allegheny Avenue at 5th Street, Philadelphia 33, Pa.**

## SMITH-DRUM TEXTILE MACHINES

*for hosiery dyeing, skein dyeing, package dyeing, beam dyeing, piece goods dyeing, package drying, skein mercerizing, warp mercerizing, hosiery inspection.*

For Better Woolen and Worsted Fabrics Use

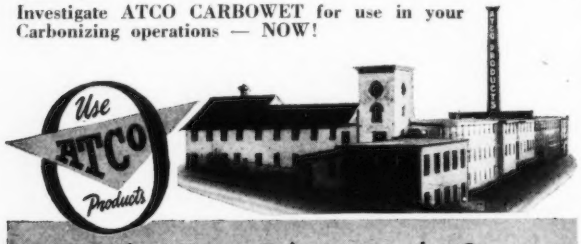
**ATCO CARBOWET**

The Better Wetting Agent for Carbonizing

By permitting complete and uniform acid penetration, ATCO CARBOWET insures speedy and successful carbonizing which results in better woolen and worsted fabrics.

ATCO-CARBOWET, a product of Atlantic RESEARCH, is another member of the impressive ATCO line of textile finishing chemicals.

Investigate ATCO CARBOWET for use in your Carbonizing operations — NOW!




*Atlantic Chemical Co.,*

PLANT AND MAIN OFFICE : CENTERDALE, RHODE ISLAND
BRANCH OFFICE : PATERSON, NEW JERSEY

**THE STANDARD DE-SIZING AGENT**

**RAPIDASE**

Dependable, speedy and economical de-sizing . . . Our technical staff always at your service.

● *for cottons rayons and mixed goods*

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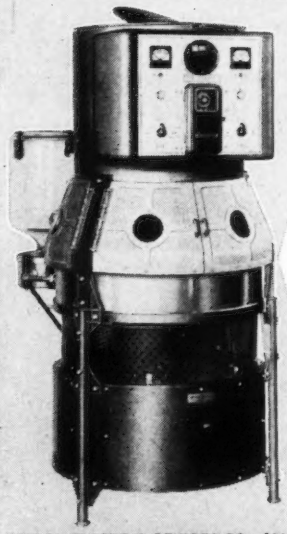
**FADE-OMETER**
**for accelerated color fading**



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Specimens are rotated around the Atlas Enclosed Violet Carbon Arc—the closest approach to natural sunlight. Temperature automatically controlled. No loss of light intensity of arc during life of machine.

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**ATLAS-OMETERS**
WEATHER-OMETER ★ LAUNDER-OMETER ★ FADE-OMETER


## • Classified Advertisements

**The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $6.25 per column inch or less per insertion.**

WANTED: Textile Chemist. Experienced in dyeing and finishing of natural and synthetic fabrics or in the production of textile chemicals. State background, age and salary expected. For large manufacturers of textile chemicals. Located in the Metropolitan area. Box No. 542.

WANTED: Textile Technologist. For a company manufacturing textile chemicals on a large scale. Located in Metropolitan area. State age, experience and background. Box No. 543.

POSITION WANTED: Chemist, age 38, married. 15 years experience, development and manufacture of textile oils. Textile plant experience. Capable of taking charge of laboratory and plant. New York or New Jersey. Box No. 544.

*Additional Classifieds on page 198)*

**NOTE**

**Essential employees need release statement. Employees who are to be hired for critical occupations need release statement and U. S. E. S. consent.**

QUALITY RICHMOND PRODUCTS

*For Better Rayon Yarn Dyeing*

USE

# RAYOSOFT

BETTER softener for wool yarns
BETTER finish for Rayons
BETTER Sulphur color Developer
BETTER after treatment for nub yarns

*Write for Free TRIAL Sample—*
*Enough for a trial run.*

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DEPARTMENT IS
AT YOUR SERVICE

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
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LeaTex

# CHEMICAL SPECIALTIES

*for the*

TEXTILE INDUSTRY

*"Always Reliable"*

LEATEX CHEMICAL COMPANY
2722 N. HANCOCK ST., PHILADELPHIA, PA.

*Exact Weight Scales*

## For Dye-House Color Blending . . .

*EXACT WEIGHT Scale Model 8003 DH (Dyehouse Special) . . . Furnished in white or blue enamel, metal parts corrosion treated to withstand chemical reaction. Sensitive to ⅛ oz. over and underweight—Capacity to 12 lbs.*

Such important operations as expert color control, formulae compounding and batch mixing in Dye-houses is best met with fraction-ounce pre-determined weighing. EXACT WEIGHT Scales have been the leaders in this field for more than twenty-five years . . . serve 53 major industries of which dye-houses are one. Specialized models have been developed expressly for your industry. New 1944 literature for your field has just been completed —Write for it.

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LOGWOOD BLACK

for

LEATHER · WOOL
SILK · COTTON
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1869 Y

DEPENDABLE SOURCE OF SUPPLY
ECONOMICAL - RELIABLE

Tannic Acid • Sumac • Quercitron
Fustic • Gambier • Flavine

THE J. S. YOUNG COMPANY
BALTIMORE, MD.

**Aromine** — Wetting agent . . . dyeing assistant . . . water normalizer.

**"Best-Service" BLEACH**—Concentrated, stabilized sodium hypochlorite solution. Perfect white on rayons and cottons obtained with economy and ease. A hosiery dyehouse staple.

**Burkol**—New synthetic organic detergent possessing exceptional scouring value. Unaffected by hard water.

**Boil-Off and Degumming Oils**—For silk, rayons, and combinations; adaptable to one, two, or split-bath methods.

**Developing Oil**—A finishing oil designed for sulphur blacks but desirable wherever a soft lustrous finish is wanted.

**Creamsol** — Concentrated stearic softener for hosiery and underwear. Ideal for finishing bleached goods but an excellent all-around softener.

**D-Scour** — Heavy-duty detergent and scouring medium . . . Use it on your hard-to-clean goods.

**Fulgayn**—Gives full recovery of weight losses on underwear tubing and other knit goods. Compatible with all finishing agents, an important consideration.

**Hosiery Softeners**—Various types to achieve any desired feel or finish.

**Metasol** — Water normalizer and soap energizer. Assures clean, bright colors. Metasol is an invaluable aid for all wet-processing operations. (Send for handbook).

**B-S Stripper**—Liquid stripper for hosiery.

**B-S Soap**—Sodium oleate-pine oil gel — a low cost scouring and dyeing assistant for hosiery and underwear.

**B-S Penetrant**—Soluble cresylic type wetting, scouring and dyeing assistant.

**Penetrant M-7X**—Extra fast wetting agent of synthetic organic type. Active in acid, alkaline, or neutral baths. Completely resistant to hard water.

**Pine-Solvent XX** — A dyehouse staple for wetting, scouring, dyeing, and bleaching. Representative of the very best in soluble pine oil-solvent wet processing agents.

**Poly-Tex A**—A new development for the scouring and dyeing of Nylon.

**Retarder L** — Retarding agent for dyeing.

**Sulfonated Oils**—Standard or special types and finishes.

**Burk-Schier Finishes**—Cation-active softening and finishing agents—a type for every need.

**BURKART-SCHIER CHEMICAL CO.**

BURK-SCHIER CHATTANOOGA, TENNESSEE BURK-SCHIER

MANUFACTURING CHEMISTS FOR THE TEXTILE INDUSTRY


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Made of a resin-coated fabric, this small bag is filled with chemicals. When water is added, the chemicals and water become heated, giving the same results obtained with electrically heated pads.

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***64%**

**of equipment now in use in the wet end of textile finishing cannot operate at a profit in competition with modern machines.**

*Proved by Research

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Offices in Providence, R. I. and Charlotte, N.C.
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**PRODUCING GUN MOUNTS FOR THE UNITED STATES ARMY**

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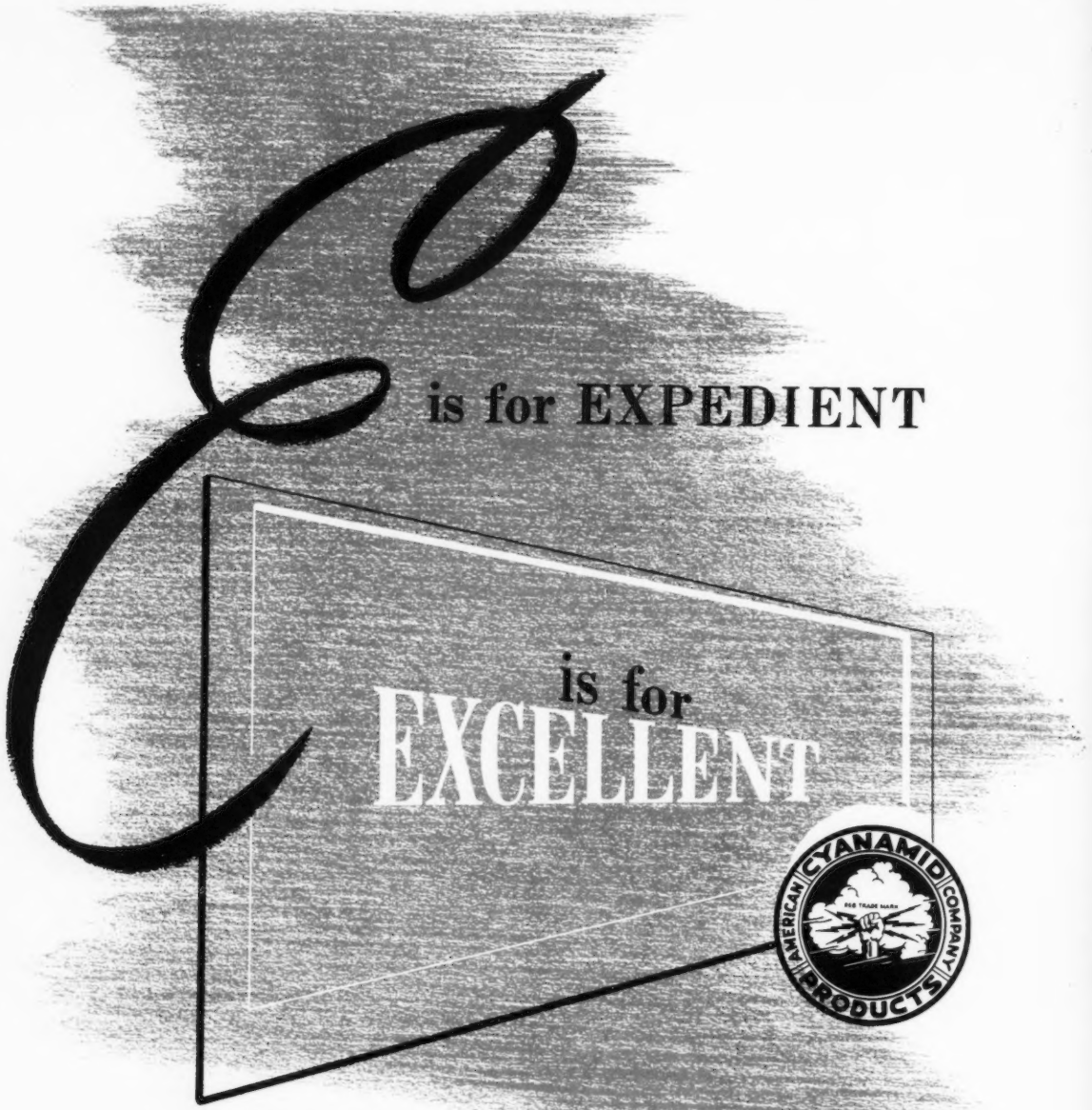


"Good enough to get by" is all that many manufacturers expected of wartime substitutes for "old reliable" materials gone critical and placed on strict war-essential priority basis.

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**& CHEMICAL CORPORATION**
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